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No. _____

# In The
# Supreme Court of the United States

MITSUBISHI MATERIALS SILICON CORPORATION, *et al.*,
*Petitioners*,

v.

MEMC ELECTRONIC MATERIALS, INC.,
*Respondent*.

*On Petition for Writ of Certiorari to the United States Court of Appeals for the Federal Circuit*

## PETITION FOR WRIT OF CERTIORARI

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## QUESTIONS PRESENTED

Whether the Federal Circuit fundamentally misapprehended the key statutory requirement of patent enablement under 35 U.S.C. § 112 and contravened this Court's holdings in *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007) and *Lujan v. Nat'l Wildlife Fed'n*, 497 U.S. 871 (1990) by vacating the summary judgment ruling that U.S. Patent No. 5,919,302 is invalid for non-enablement, based solely on inventor declarations asserting the legal conclusion that the broad patent claims were enabled but providing no "specific facts" to support the assertion as required under Fed. R. Civ. P. 56(e).

## PARTIES TO THE PROCEEDINGS BELOW

Pursuant to Supreme Court Rule 14.1, petitioners (collectively "SUMCO") state that all parties to the proceedings in the court whose judgment is sought to be reviewed are as follows:

*Petitioners:*

Mitsubishi Materials Silicon Corporation,
Mitsubishi Silicon America Corporation,
Sumitomo Mitsubishi Silicon Corporation (also known as Sumco),
Sumco USA Corporation (also known as Sumco USA), and
Sumco USA Salses Corporation (also known as Sumco USA Sales),

*Respondent:*

MEMC Electronic Materials, Inc.

## RULE 29.6 STATEMENT

Mitsubishi Materials Silicon Corporation has no parent corporation. Mitsubishi Silicon America Corporation has no parent corporation. Sumitomo Metal Industries, Ltd. and Mitsubishi Materials Corporation are the parent corporations of SUMCO (formerly Sumitomo Mitsubishi Silicon Corporation) and own 10% or more of its stock. SUMCO is the parent corporation of SUMCO Phoenix Corporation (formerly SUMCO USA Corporation). No publicly-held company owns 10% or more of the stock of Mitsubishi Materials Silicon

Corporation, Mitsubishi Silicon America Corporation, SUMCO Phoenix Corporation (formerly SUMCO USA Corporation) or SUMCO USA Sales Corporation.

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## PETITION FOR A WRIT OF CERTIORARI

Petitioners ("SUMCO") respectfully seek a writ of certiorari to review the judgment of the United States Court of Appeals for the Federal Circuit.

## OPINIONS BELOW

The opinion of the court of appeals is not reported, but can be found at 2007 U.S. App. LEXIS 22434 (Fed. Cir. Sept. 20, 2007) and is reproduced in the Appendix ("App.") at 1a-13a. The opinions of the District Court for the Northern District of California can be found at 2006 U.S. Dist. LEXIS 9353 (N.D. Cal. Feb. 24, 2006) and 2006 U.S. Dist. LEXIS 9241 (N.D. Cal. Feb. 24, 2006). App. 14a-103a, 104a-119a.

## JURISDICTION

The court of appeals entered judgment on September 20, 2007. The court of appeals denied a timely petition for rehearing on October 17, 2007. App. 120a-121a. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

## STATUTORY PROVISIONS

The pertinent statutory provisions are 35 U.S.C. § 112 and Rule 56 of the Federal Rules of Civil Procedure. App. 122a-126a.

Paragraph 1 of 35 U.S.C. § 112 requires that:

> The specification shall contain a written description of the invention and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most closely connected, to make and use the same ...

Rule 56 (emphasis added) provides that:

> A party against whom a claim, counterclaim, or cross-claim is asserted or a declaratory judgment is sought may, at any time, move with or without supporting affidavits for a summary judgment in the party's favor as to all or any part thereof. . . . The judgment sought shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law. . . . When a motion for summary judgment is made and supported as provided in this rule, an adverse party may not rest upon the mere allegations or denials of the adverse party's pleading, but the adverse party's response, by affidavits or as otherwise provided in this rule, must set forth specific facts showing that there is a genuine issue for trial. If the adverse party does not so respond, summary

judgment, if appropriate, shall be entered against the adverse party.

## INTRODUCTION

This case brings into focus both 1) the legal requirement of patent enablement, which this Court has not addressed for 70 years, and 2) the proper standard for summary judgment, as to which the Federal Circuit disregarded the clear precedent of this Court. The Federal Circuit's decision in this case reinstated MEMC's broad patent asserted to cover low-defect silicon wafers, thereby restraining competition in a vital area of technology, notwithstanding the fact that MEMC was never able to make the wafers described in its patent. The Federal Circuit reached this result because it erroneously concluded that a patent owner may avoid a summary judgment of patent invalidity merely by submitting conclusory declarations of inventors opining on the ultimate legal conclusion of patent validity without presenting specific facts to support that opinion.[1] *See* App. 10a-11a.

The Federal Circuit's decision will have serious adverse consequences, both substantive and procedural. As a matter of substantive patent law,

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[1] The ground of invalidity at issue here, lack of enablement, is a legal question, resting on factual underpinnings. *Union Pac. Res. Co. v. Chesapeake Energy Corp.*, 236 F.3d 684, 686 (Fed. Cir. 2001).

the decision allows would-be inventors to imagine a product and to obtain a patent granting exclusive rights to that product, without ever producing, or teaching the public how to produce, the supposed invention. Having contributed nothing to the body of technological information, the patentee nevertheless then can use this "paper patent" to exclude others from the field, including even a true inventor who discovers how to do what the patentee only imagined. The statutory requirement that a patent be enabled, under 35 U.S.C. § 112, exists to prevent precisely this abuse, but the Federal Circuit's decision here strips that statutory requirement of any meaning.

As a matter of federal procedure, the Federal Circuit again treats patent cases as a world apart from other federal litigation. The decision below creates a standard for summary judgment in patent cases different than, and in conflict with, the standard that applies in all other federal matters. That separate, and erroneous, patent-specific standard will substantially increase the cost and complexity of what is already extraordinarily costly and complex litigation, and will undermine the proper functioning of the patent laws, all to the detriment of the Nation's economy.

In February 2006, the district court held that U.S. Patent No. 5,919,302 (the "'302 patent") is invalid for non-enablement under 35 U.S.C. § 112. App. 66a. The court properly determined that two inventor declarations did not raise a genuine issue of material fact, because the declarations failed to

provide specific facts to support their conclusion that the broad patent claims were enabled by the patent specification. App. 56a-67a, 89a-91a. In a cursory, unpublished opinion in September 2007, the Federal Circuit vacated the invalidity ruling, finding that a genuine issue of material fact was created by the conclusory inventor declarations opining on the ultimate legal question of enablement. App. 9a-11a.

By treating the inventor declarations as if they automatically created a genuine issue of material fact, the Federal Circuit disregarded important aspects of the district court's opinion, including that court's identification of the specific facts omitted from the declarations that made them too conclusory to raise a triable issue of fact. The Federal Circuit also disregarded this Court's explicit admonition that "a conclusory affidavit" addressing a legal question does not "exclude the possibility of summary judgment". *KSR*, 127 S. Ct. at 1745-46. In *KSR*, this Court held a patent invalid for obviousness despite expert affidavits providing reasons why the combination of prior art elements was not obvious. *Id.* This Court held that the expert declarations did not raise a genuine issue of material fact that would "dislodge" the conclusion that the patent was obvious, because obviousness is ultimately a question of law. *Id.*

The present case demonstrates that the Federal Circuit continues to misunderstand the role of expert and even inventor testimony in its eagerness to find triable issues of fact on legal questions of

patent validity. The decision effectively provides patentees a free pass to trial on validity so long as they submit an inventor declaration opining that the claims are valid. The Federal Circuit's error is particularly troubling because, by treating the legal question of enablement as a factual issue to be determined on the basis of inventor or expert testimony, the lower court vitiated the "the most important patent doctrine after obviousness." *See Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 42 Fed. Appx. 439, 451 (Fed. Cir. 2002) (Rader, J. dissenting). Enablement is the fundamental legal principle that controls the scope of patent claims, affecting all patents and patent applications. The statutory requirement to provide an enabling disclosure is the crucial *quid pro quo* for the right to exclude. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 142 (2001). The enablement requirement "serves as the line of demarcation between the visionary theorist (adds nothing to the useful arts) and the visionary pioneer (contributes to the useful arts)." *Enzo Biochem,* 42 Fed. Appx. at 452.

In this case, the visionary pioneer was Dr. Jea-Gun Park. Dr. Park invented the "growth window" process for producing low-defect silicon wafers in 1996 – a breakthrough process that had eluded researchers throughout the industry despite years of intensive efforts – and was awarded U.S. Patent No. 6,045,610 (the "Park/Samsung patent"). MEMC obtained the '302 patent and its broad patent claims by incorrectly positing that a different process involving "slow-cooling" would result in

low-defect silicon wafers. MEMC was only a theorist, and one whose theory did not actually work. Indeed, because MEMC was unable to make low-defect silicon wafers as described in its patent, MEMC licensed the Park/Samsung patent.

MEMC's inability to invent a process to actually produce low-defect silicon wafers did not inhibit it from seeking broad patent claims that would ostensibly encompass any low-defect silicon wafer product. In allowing the '302 patent, the patent examiner had no means to ascertain whether the slow-cooling process proposed by MEMC would actually result in the silicon wafer product that MEMC claimed. Thus, even though SUMCO licensed and uses the Park/Samsung patent which actually does work to produce low-defect silicon wafers, MEMC sued for infringement asserting that its *product* claims were infringed. Because the '302 patent contains neither the theory nor the critical details to enable those in the art to make the claimed silicon wafers, the asserted claims are invalid for non-enablement.

The undisputable facts and the narrow scope of the Federal Circuit's ruling present an ideal opportunity for this Court to address both summary judgment procedure in patent cases and patent enablement law.

## STATEMENT OF THE CASE

The '302 patent is directed to silicon wafers. Silicon wafers are the building blocks of virtually all electronic products, including cell phones,

digital cameras, and computers. Silicon wafers are sliced from silicon ingots that are generally 200 or 300 mm in diameter.

Conventional silicon ingots are made in large furnaces in which silicon is melted and a seed of crystal silicon is lowered into the silicon melt and then withdrawn at an imperceptibly slow pull rate while being slowly rotated. Conventionally-grown silicon crystal is one of the purest substances on earth and, until the mid-1990s, was sufficiently pure for use in many electronic circuits without further purity enhancement.

## The State of the Prior Art

The theoretical knowledge for enhancing purity, however, had long been available. In 1982, Dr. Vladimir Voronkov reported that "defect-free zones" exist at the critical $v/G$ ratio, *i.e.*, the ratio of the

pull rate $v$ to the axial temperature gradient G at the ingot/melt interface. [2] However, stringent control of these growth conditions precisely at the critical $v$/G ratio is incredibly difficult. Drs. Eidenzon and Puzanov were among the first researchers to report, between 1986 and 1997, the laboratory growth of larger regions of low-defect silicon by applying Voronkov's theory.

By the mid-1990s, nevertheless, a viable process for commercial production of wafers that were entirely comprised of low-defect silicon still had not been developed. "Notwithstanding many theoretical investigations by physicists, material scientists and others, and many practical investigations . . . , there continue[d] to be a need to reduce the defect density in monocrystalline silicon wafers." [3] Park/Samsung patent, col. 3, lines 22-26. The "ultimate need" was for pure silicon wafers that are generally "free" of yield-reducing defects, *i.e.*, "low-

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[2] V.V. Voronkov, *The Mechanism of Swirl Defects Formation in Silicon*, 59 J. of Crystal Growth 625 (1982) (A14939-57).

[3] MEMC cited this industry need for low-defect wafers in its response to a rejection by the Patent Office during the 1999 prosecution of related U.S. Patent No. 6,287,380: "This failure is evidenced by the fact that since the publication of Voronkov's paper in 1982, the silicon industry has been plagued by the formation of agglomerated interstitial and vacancy defects in relatively large diameter, Czochralski-grown silicon and researchers have littered the patent and technical literature with proposed solutions to this problem."

defect" wafers.[4] *Id.* Low-defect silicon wafers allow more complex electronic circuits to be built in even more condensed silicon regions.

In the mid-1990s, as the need for wafers that could accommodate more complex circuits escalated, Samsung Electronics Company ("Samsung") led the industry in demanding higher purity silicon wafers. In 1995, Dr. Park of Samsung worked closely with the world's largest silicon wafer supplier, Shin-Etsu Handotai, in their unsuccessful experiments to produce low-defect wafers. One approach taken by Shin-Etsu involved *slow-cooling* during ingot growth. By early 1996, however, Dr. Park concluded that slower cooling rates still resulted in yield-reducing defects and that a different approach was required.

Dr. Park's breakthrough was his realization that the maintenance of a low-defect *growth window*, very narrow but production-viable, would result in low-defect wafers. The upper and lower

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[4] No silicon wafer is completely "pure" or "defect-free." What is considered "low-defect," "pure" or "defect-free" silicon varies over time and by application. SUMCO uses the term "low-defect" herein to refer to silicon wafers largely without yield-reducing agglomerated defects, even though smaller agglomerated defects exist. The '302 patent defines the key claim limitation "substantially free of agglomerated defects" as: below the detection limit of such defects, which is 1000 agglomerated defects/$cm^3$. MEMC has never presented scientifically reliable test evidence that any wafers have fewer than 1000 defects/$cm^3$. Accordingly, the accused SUMCO wafers were held to not infringe the '302 patent. App. 7a-8a.

bounds of the low-defect growth window could be determined through experiments, modeling and simulation in conjunction with a specially-designed hot zone for fast cooling. Park/Samsung patent, col. 4, lines 5-26; col. 5, lines 34-61; col. 8, line 47-col. 9, line 5. Thus, Dr. Park invented the method to produce the "dream wafer" – low-defect silicon across the entire wafer – and filed for patent protection in Korea in February 1997 and in the U.S. in October and December 1997. Because MEMC presented no corroborating evidence that it reduced the claimed wafers to practice prior to its April 9, 1998 filing date, the status of the Park/Samsung patent as prior art is unassailable. App. 63a-64a, 88a-91a.

When Dr. Park invited MEMC to assist Samsung in commercially developing his invention in 1996, MEMC declined and informed Samsung that it was pursuing a different theory involving slow-cooling. MEMC was as unsuccessful as Shin-Etsu. [5] MEMC's sales to Samsung were substantially reduced during 1997 and 1998,

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[5] An August 1997 article by Dr. Voronkov, co-authored with alleged inventors Robert Falster and Joseph Holzer, acknowledges the limitations of slow-cooling: "To decrease the void density, the cool rate in the range below 1100° C may be lowered by a special design of the puller hot zone. There are, however, practical limitations to the amount of defect density reduction achievable by such a technique." V.V. Voronkov et al., *Behaviour and Effects of Intrinsic Point Defects in the Growth of Large Silicon Crystals*, 97-22 Electrochemical Society Proceedings 3 (Aug. 1997) (A356-70).

because MEMC could not even supply sample low-defect silicon wafers to Samsung. During six years of litigation, MEMC was unable to present any evidence that it ever successfully used the disclosed slow-cooling process to make the wafers claimed in the '302 patent, or that any such wafers comprised low-defect silicon across the entire diameter of the wafer. App. 90a-91a. Because it could not make low-defect silicon wafers, MEMC ultimately licensed the Park/Samsung patent to enable it to produce low-defect wafers.

Dr. Park developed his invention instead with suppliers SUMCO and Shin-Etsu beginning in April 1996, and both of them later licensed the Park/Samsung patent. SUMCO uses the Park/Samsung technology, and not slow-cooling, to produce the low-defect silicon wafers that MEMC accused of infringement. Although it pioneered slow-cooling, Shin-Etsu also uses the technology of the Park/Samsung patent to produce low-defect wafers. Shin-Etsu determined at least three years before MEMC's 1998 patent filing that slow-cooling cannot produce the low-defect wafers that result from the Park/Samsung patent.[6]

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[6] The limitations of slow-cooling in reducing defects are set forth in Shin-Etsu's U.S. Patent No. 5,728,211 (the "Takano patent"). The Takano patent, which was the primary reference cited by the Patent Examiner during the examination of the '302 patent, provides exhaustive experimental results to determine the optimum slow-cooling rate. Wafers produced with the optimum slow-cooling rate still have defects that are orders of magnitude greater than

## The Asserted Patent

Knowing that it was lagging the competition,[7] MEMC cobbled together generally known principles including the failed theory of slow-cooling into a patent application to seek broad, open-ended patent claims to ensnare all low-defect silicon wafers irregardless of how they were made. By April 1998 when it filed for the '302 patent, MEMC knew that its slow-cool theory had not panned out – even MEMC's best litigation contention regarding an alleged reduction to practice (which was rejected by the district court) was that it made wafers with a useless 24 or 30 mm band of allegedly low-defect silicon surrounded by many agglomerated defects. *See* App. 90a-91a. Because MEMC could not actually make low-defect wafers, MEMC could not disclose the information to enable others to do so. Thus, the '302 patent contains neither a workable theory nor the details recognized in the art as important, such as a hot zone design and modeling or simulation information. *See* App. 64a-67a.

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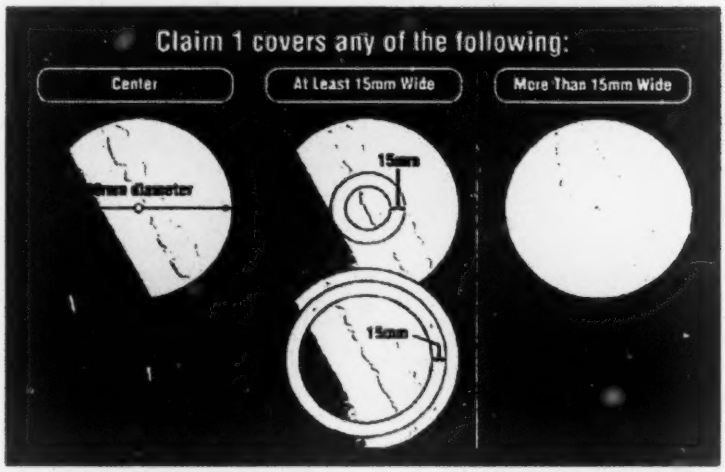
the less than 1000 defects per cubic centimeter alleged in the '302 patent. Takano patent, cols. 3-6.

[7] When MEMC learned that Samsung would reduce its purchases because MEMC's competition was producing wafers comprised of low-defect silicon across the entire wafer diameter, MEMC was still trying to develop what it called semi-perfect silicon wafers containing only a *region* of low-defect silicon that was still surrounded by defects. *See* App. 91a.

MEMC nonetheless staked patent rights over low-defect technology by crafting open-ended product claims. Claim 1, the only asserted independent claim, requires a silicon wafer with a band that is "substantially free" of defects with "a width of at least about 15 mm" or any amount of defect-free silicon if at "the central axis". App. 19a. The claim has no upper limit on the amount of low-defect silicon and has no lower limit on the amount of defect reduction; this would include a wafer defect-free across the entire diameter, as shown in MEMC's alleged claim coverage exhibit below.




MEMC's claims were, thus, a contrivance to *ostensibly* cover the "dream wafer" that Samsung had invented and that MEMC was unable to produce before licensing the Park/Samsung technology.

**The District Court Ruling of Non-enablement**

In addition to determining that the '302 patent was not infringed by the accused SUMCO wafers,[8] the district court determined that SUMCO had established by clear and convincing evidence that the "quite expansive" claims of the '302 patent were not enabled. App. 65a-66a. The district court decided that MEMC's rebuttal declarations were unsupported by necessary specific facts, uncorroborated by independent evidence, unsupported by the patent specification, failed to address SUMCO's evidence, and, in actuality, supported SUMCO's assertion that the necessary enablement guidance is missing from the '302 patent. App. 63a-67a.

The district court scrutinized the MEMC declarations before determining that MEMC failed to point to any details in the '302 patent or any other specific facts to support its assertions. The court concluded that the declarations 1) were silent on the amount of experimentation conducted to allegedly achieve the claimed wafers, and 2) did not dispute the importance of the hot zone or that the necessary hot zone was not disclosed in the patent. App. 64a-66a. To the extent that the declarations

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[8] The district court found that MEMC "utterly failed" to establish the admissibility of any expert testimony involving testing, which was held to be scientifically unreliable to prove whether any silicon wafer meets the claim limitations, for both the accused SUMCO silicon wafers and MEMC's alleged reduction to practice. App. 104a-119a; App. 91a.

relied on an uncorroborated alleged reduction to practice, the district court determined that the declarations did not establish: 1) that what was made would meet the claim limitations; 2) that the cooling method described in the patent was followed; or 3) that the named inventors recognized that the wafers possessed the claimed characteristics. App. 90a-91a. Because the declarations omitted specific facts necessary to adequately support the inventors' opinion on the ultimate issue that the patent claims were enabled, the declarations were too conclusory to raise a genuine issue of material fact. App. 63a-66a.

The district court was also plainly troubled by the lack of any new concepts or details for equipment to implement the "design criteria": MEMC failed to identify any "provision in the '302 patent that describes or discloses the means used to achieve the required control of the cooling rate" other than the uninformative direction to use "any means currently known in the art." App. 65a-66a. The district court determined that MEMC did not dispute that "a specific hot zone design coupled with modeling and simulation work is essential to producing defect-free zones in silicon wafers." App. 66a.

Accordingly, for multiple reasons, the district court determined that MEMC's declarations were insufficient to raise a genuine issue of material fact.

## The Federal Circuit Ruling

The Federal Circuit affirmed the district court's *Daubert* ruling and summary judgment of no infringement. [9] However, the Federal Circuit vacated the summary judgment that the '302 patent was invalid for non-enablement, finding that the two inventor declarations raised a genuine issue of material fact by opining that the so-called "design criteria" disclosed in the patent would be sufficient to create the claimed silicon without undue experimentation. App. 9a-11a.

The Federal Circuit did not address the district court's careful identification of the specific facts omitted from the declarations that made them too conclusory to raise a genuine issue of material fact. Because the Federal Circuit equated the existence of the inventor opinions with the existence of a genuine issue of material fact, it did not address the rich evidentiary record of non-enablement. Nor did the Federal Circuit address the evidence that

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[9] The Federal Circuit affirmed that the MEMC tests "cannot prove that all the claim limitations are met" and "to the extent that [MEMC's employee/expert] varied the standard testing methodology, the record supports the trial court's conclusion that such modifications rendered the tests unreliable." App. 7a-8a. The court held that references to a silicon wafer as "defect-free" or made of "pure silicon" are not "probative of whether the accused SUMCO wafers are 'substantially free of agglomerated vacancy intrinsic point defects' as that phrase was construed by the trial court and defined in the '302 patent, *i.e.*, whether the wafers have fewer than 1000 agglomerated vacancy defects per cubic centimeter." App. 8a.

the so-called "design criteria" consisted of only well-known prior art parameters that did not result in the claimed silicon wafers.

The Federal Circuit's decision effectively reinstates the validity of the '302 patent despite overwhelming evidence of invalidity. The '302 patent is a foundational patent to what MEMC publicizes as "an all-encompassing patent domain" on low-defect silicon wafers. MEMC built a thicket of more than thirty issued and still-pending patents based on the invalid '302 patent. MEMC has repeatedly threatened to assert its '302 patent family against most of the world's major silicon wafer producers, and is currently doing so in litigation against the leading innovator of silicon-on-insulator wafer technology, S.O.I.TEC Industries.

## REASONS FOR GRANTING THE PETITION

The Federal Circuit erred in vacating the invalidity ruling of the district court. Overwhelming real-world, contemporaneous and independent evidence proved that the slow-cooling process disclosed in the '302 patent did not work to produce low-defect silicon and that the details essential to actually making low-defect silicon are not disclosed in the '302 patent. MEMC's evidence in opposition hinged upon conclusory declarations from two named inventors averring that slow-cooling would produce the claimed wafers without specific facts supporting such a conclusion. The Federal Circuit did not consider the overwhelming

evidence of non-enablement, but instead decided that the conclusory inventor declarations created a genuine issue of material fact.

Because expert/inventor declarations are invariably submitted in patent cases, such declarations cannot be permitted to automatically preclude the possibility of summary judgment and cannot be permitted to defeat summary judgment where the declarations are merely conclusory, as dictated by Fed. R. Civ. P. 56(e). Explicit direction by this Court is needed in view of the failure of the Federal Circuit to follow *KSR* and *Lujan*. The propensity of the Federal Circuit to find triable issues of fact on patent validity allows invalid patents to survive summary judgment based on nothing more than an inventor or expert declaration opining on the ultimate legal issue.

On the substantive issue of patent enablement, recent precedent is non-existent: this Court has not addressed the enablement requirement since well before the Patent Act of 1952. The Federal Circuit's decision set too low a standard for enablement by failing to consider the real-world and contemporaneous evidence of non-enablement while accepting the inventors' conclusory allegation that vague "control" of known principles would enable the full scope of "quite expansive" patent claims without undue experimentation. This low threshold is particularly troubling when no evidence exists that MEMC ever made silicon wafers meeting the claim limitations by using the slow-cooling process conveyed by the '302 patent.

The Federal Circuit's decision thus conflicts with this Court's last guidance concerning the enablement requirement which focused on the issue of whether the alleged invention had been made. *See Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 65-66 (1923); *Minerals Separation, Ltd. v. Hyde*, 242 U.S. 261, 270-71 (1916); *Loom Co. v. Higgins*, 105 U.S. 580, 586-87 (1882).

## I. The Federal Circuit Erred by Departing from *Lujan's* Holding that Conclusory Declarations are Insufficient to Create Genuine Issues of Material Fact

The Federal Circuit's reversal of the invalidity ruling opens the door for patent owners to defeat summary judgment with nothing more than inventor assurances that their patents are enabled. It can be safely assumed that the inventors of every issued patent will assert that their patent specification enables their claims, thus ensuring a trial on the issue in every case in which it arises. The erroneous view that a conclusory inventor declaration precludes summary judgment imposes substantial and unwarranted costs on innovating companies.

Summary judgment is an essential vehicle for those accused of infringement to challenge questionable patents without the expense and risk of trial. The ability to invalidate poor quality patents by summary disposition prior to trial is crucial to an effectively functioning patent system, especially where legal questions of patent validity such as enablement and obviousness are at issue.

With roughly half of litigated patents demonstrably invalid, the patent system depends upon the litigation process to filter out poor quality and overbroad patents before trial.[10]

Because the Federal Circuit is the sole arbiter of patent disputes at the intermediate appellate level, the ease with which that court finds genuine issues of material fact will chill the district courts in granting summary judgment of invalidity when warranted for fear of reversal.[11] Companies willing to expend their financial resources to invalidate poor quality patents must have confidence that patentees cannot effortlessly defeat summary judgment merely by the submission of conclusory declarations from experts or especially inventors. Companies are inhibited from challenging even the most dubious of patents when exposure to the

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[10] John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 205-206 (1998) (demonstrating that 46% of patents litigated to judgment on validity issues are held invalid); Patstats, U.S. Patent Litigation Statistics, University of Houston Law Center, http://www.patstats.org/2003.html (detailing that, in 2003, of 201 validity decisions, the patent was found to be invalid 117 times, 58%).

[11] This Court has cautioned that district court "reluctance" to grant summary judgment, which they are "obliged" to do where no reasonable jury could determine the issue otherwise, "due to unfamiliarity with the subject matter" should be remedied by the Federal Circuit. *Warner-Jenkinson Co. v. Hilton Davis Chemical*, 520 U.S. 17, 38 n.8 (1997); *See also Celotex Corp. v. Catrett*, 477 U.S. 317, 322-323 (1986). Instead, the Federal Circuit has exacerbated the problem.

enormous expense and uncertainties associated with trial becomes probable. These procedural uncertainties and the attendant costs encourage companies to license rather than to contest invalid patents, even though access to enabling technology is supposed to be the foremost reason for licensing.

As this Court has made clear, conclusory declarations unsupported by specific facts or data are insufficient to raise a genuine issue of material fact. *Lujan v. Nat'l Wildlife Fed'n*, 497 U.S. 871, 888 (1990). In *Lujan*, this Court held that the "general averments" of affidavits cannot be assumed to "embrace the 'specific facts' needed to sustain the complaint." *Id.*

> As set forth above, Rule 56(e) provides that judgment "shall be entered" against the nonmoving party unless affidavits or other evidence "set forth specific facts showing that there is a genuine issue for trial." The object of this provision is not to replace conclusory allegations of the complaint or answer with conclusory allegations of an affidavit. Rather, the purpose of Rule 56 is to enable a party who believes there is no genuine dispute as to a specific fact essential to the other side's case to demand at least one sworn averment of that fact before the lengthy process of litigation continues. *Id.* (citations omitted).

The Federal Circuit here failed to recognize that the inventor declarations were entirely conclusory on the ultimate legal issue, averring only that the so-called "design criteria" would be sufficient to

enable the making of the claimed invention by routine experimentation. The two named inventors, Drs. Robert Falster and Joseph Holzer, generally opined that:

> Using the extended cooling teachings of the '302 patent, it would be well within the knowledge and ability of one skilled in the art in 1998 to modify a then existing crystal puller with the commonly found insulators, heaters, radiation shields and magnetic fields of that time period to extend and control the time down to 1050 degrees C. In this manner, it would be a matter of routine adjustment for a person skilled in the art to tune the crystal puller to produce silicon wafers covered by any of claims 1-6 and 9-12 of the '302 patent.

The declarations set forth nothing more than the ultimate legal conclusion that a person skilled in the art could follow the patent specification to produce the claimed invention without undue experimentation, dressed up in language tailored to the technology at hand. The inventors failed to point to any specific guidance in the '302 patent itself. App. 64a-66a. The inventors failed to present any evidence about the amount and nature of any experimentation. *Id.* The inventors failed to show that any silicon that they made possessed the claimed characteristics. App. 90a-91a. The inventors also failed to show that any silicon that they made was produced under the slow-cooling durations in the '302 patent. *Id.* Thus, numerous

specific facts necessary to support the averment of enablement were lacking. App. 63a-67a, 90a-91a.

The Federal Circuit accused the district court of having not considered the declarations at all, stating that: "to the extent the trial court failed to consider the declarations of MEMC witnesses because they were not corroborated by independent evidence, that was error." App. 11a. But whether or not independent corroboration is required for the inventors' bare contention that they made the claimed wafers, the district court referred to corroboration only as an "initial matter" and plainly fully considered the declarations. App. 63a-64a. The district court stated that the declarations "do not create a genuine issue of fact precluding summary judgment," because they failed to present numerous specific facts necessary to support the ultimate opinion of enablement or the fact that the claimed silicon wafer was ever made.[12] App. 64a-67a, 90-91a.

Under Fed. R. Civ. P. 56(e) and *Lujan,* summary judgment of patent invalidity must be available

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[12] The Federal Circuit's criticism is questionable. An assertion of making a claimed invention has long required corroboration by independent evidence as discussed, *e.g.*, in *Cooper v. Goldfarb*, 154 F.3d 1321, 1330 (Fed. Cir. 1998). Nevertheless, the district court ruled that MEMC's bare contention of an alleged reduction to practice was lacking for other independent reasons and the court did not rely solely on the lack of corroboration. Importantly, MEMC did not present any specific factual testimony on those underlying facts that were identified as not corroborated.

where the opposing declarations are insufficiently grounded in facts.

## II. The Federal Circuit Erred by Departing from *KSR's* Holding that Declarations do not Necessarily Create Genuine Issues of Material Fact on Legal Questions of Validity

Because enablement is ultimately a legal question, enablement can be resolved on summary judgment even where contrary factual evidence is submitted. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1745-46 (1997).

On strikingly similar facts, the Federal Circuit in *KSR* reversed the district court's summary judgment of invalidity in an unpublished opinion, because the Federal Circuit incorrectly decided that the affidavits of two experts created a genuine issue of material fact regarding the legal question of obviousness.[13] *Id.* This Court rejected the Federal Circuit's approach, stating that:

> To the extent the court understood the Graham approach to exclude the possibility of summary judgment when an expert provides a conclusory affidavit addressing the question of obviousness, it

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[13] The Federal Circuit's other ground for reversal was the failure to comply with its teaching-suggestion-motivation test; this Court criticized the Federal Circuit's rigid application of that test. *KSR*, 127 S. Ct. at 1745-46.

> misunderstood the role expert testimony plays in the analysis. In considering summary judgment on that question the district court can and should take into account expert testimony, which may resolve or keep open certain questions of fact. That is not the end of the issue, however. *The ultimate judgment of obviousness is a legal determination.* Where [the key facts] are not in material dispute, and the obviousness of the claim is apparent in light of these factors, summary judgment is appropriate. Nothing in the declarations proffered by Teleflex prevented the District Court from reaching the careful conclusions underlying its order for summary judgment in this case." *Id.* (emphasis added).

This Court concluded that no issues of fact concerning secondary factors were sufficient "to dislodge the determination" of obviousness. *Id.* at 1746.

The present case is even more compelling, because here the two declarations are from decidedly interested inventors, rather than nominally independent experts, which raises the oft-cited "concern that a party . . . might be tempted to describe his actions in an unjustifiably self-serving manner in order to obtain a patent *or to maintain an existing patent*." *Singh v. Brake*, 222 F.3d 1362, 1367 (Fed. Cir. 2000) (emphasis added); *see also T. H. Symington Co. v. Nat'l Malleable Castings Co.*, 250 U.S. 383, 386 (1919). As in *KSR*,

the evidence demonstrates that the unsupported opinions of the inventors are insufficient to "dislodge" the legal determination of non-enablement. The evidence of non-enablement in this case was at least as powerful as the evidence of obviousness in *KSR*, including real-world evidence, contemporaneous documents and publications, and the declarations of three experts all with direct experience in making low-defect silicon, including the testimony of two industry pioneers, Drs. Eidenzon and Park. *See* App. 59a-63a.

- Three experts with extensive experience in producing low-defect silicon, Drs. Eidenzon, Park and Wildes, set forth detailed factual reasons and evidence supporting their conclusions that the '302 patent does not disclose any method or apparatus for forming the claimed silicon wafer. App. 59a-64a. Based on nearly 30 years of experience in defect reduction, independent expert Dr. Eidenzon concluded that the '302 patent "is useless to anyone working in this field." App. 61a.

- The '302 patent specification lacks the hot zone and modeling and simulation information "essential" to manufacturing low-defect wafers, as contemporaneously substantiated by the Park/Samsung patent and Eidenzon's publications. App. 65-66a.

- The wordy but substantively meager '302 patent contains no new concepts. The '302 patent contained only a general description

of well-known parameters (namely, the pull rate v, temperature gradient G, and cooling time). Voronkov's key v/G ratio had been known since 1982. App. 59a.

- Through six years of litigation, MEMC failed to produce any admissible evidence that any silicon wafers meeting the claim limitations have ever been made, or that low-defect silicon wafers have ever been made using the slow cooling parameters of the '302 patent. App. 91a.

- Real-world evidence of non-enablement includes the inability of both Shin-Etsu and MEMC to successfully use slow-cooling to produce low-defect wafers, as contemporaneously substantiated by the 1996 Takano patent (supra at n.6), the 1997 article co-authored by Dr. Voronkov and the two named inventors Drs. Falster and Holzer (supra at n.5), and the licensing of the Park/Samsung patent. Together representing more than 80% of the world's silicon wafer manufacturing, Shin-Etsu, SUMCO and MEMC have all licensed and used the Park/Samsung patent. No one licensed the '302 patent.

The only fact MEMC submitted in opposition to this overwhelming evidence was the undisputed high level of skill in the art. MEMC also submitted the inventors' opinion that routine adjustment of known equipment by applying slow-cooling with control of the design criteria (namely, the pull rate

$v$, temperature gradient G, and cooling time) would result in the claimed silicon, based on their assertion that silicon meeting the claim limitations had been made.

However, the district court held that the bare assertion that silicon was made was not supported by factual evidence and was, moreover, inadmissible under *Daubert* as based on scientifically unreliable evidence, as affirmed by the Federal Circuit. App. 8a-9a, 63a-65a, 91a. MEMC's declarations also did not present necessary supporting factual evidence about the amount of experimentation undertaken by the inventors, how the silicon met all of the claim limitations, the extent to which the process allegedly used is disclosed in the patent, the extent to which the process disclosed in the patent was used to produce the silicon, and whether the inventors even recognized whether what they made was significant. App. 63a-67a, 90a-91a. The inventors' assurance that their patent specification enables their claims is particularly meaningless in view of the paucity of detail with respect to the underlying facts.

MEMC's bald assertion that one of ordinary skill would have the ability to modify standard equipment using known "design criteria" to obtain the claimed wafers is furthermore belied by the real-world evidence of its own failures and its subsequent license of another's technology. *See Plant Genetic Sys., N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1344 (Fed. Cir. 2003). MEMC's

failures, as well as other industry failures, firmly establish that more than routine experimentation would be required. *See AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244-45 (Fed. Cir. 2003) (given the "failures to make and use the later claimed invention at the time of the application, the district court correctly concluded that there was no genuine issue of material fact relating to undue experimentation as it relates to enablement."); *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1372 (Fed. Cir. 1999) (finding non-enablement based, in part, on the "replete" record of "the inventor's own failed attempts"). MEMC never surmounted the difficulty of producing low-defect silicon wafers – even with all of its silicon wafer experience – and was forced to take a license to the Samsung/Park technology in order to make low-defect wafers.

The Federal Circuit contradicted itself in considering the uncorroborated assertion of the inventors that they made the claimed wafers: "Both the inventors and [an MEMC employee] asserted in their declarations that wafers obtained from those ingots fall within the scope of the patent claims." App. 10a. The Federal Circuit's reliance on such evidence is inexplicable and cannot be reconciled with its affirmance of the district court's conclusion that this evidence was inadmissible under *Daubert*. App. 7a-8a, 91a. There is no admissible evidence in the record that MEMC ever made the claimed silicon.

The '302 patent simply does not contain the type of details that those in the art recognize as crucial. Hot zone design and modeling and simulation to maintain growth within the critical growth window are the key to making low defect silicon wafers – the '302 patent admittedly does not disclose anything other than conventional equipment. *See In re Glass*, 492 F.2d 1228, 1233 (C.C.P.A. 1974) (disclosure insufficient where specification failed to disclose temperature gradients, flow rates and other matters needed to practice the claimed invention, leaving the court with the "strong feeling" that the applicant either "did not have possession of the details of a single operative process or, if he did, he chose not to divulge them"). The district court, in fact, found that MEMC's declarations compelled the conclusion that the necessary guidance for producing low-defect wafers is "sorely lacking," because they pointed only to the '302 disclosure of "known" equipment yet acknowledged that an undisclosed "modified" hot zone was used by the alleged inventors. App. 65a-66a.

The district court determined that the breadth of the open-ended product claims of the '302 patent are "quite expansive." App. 65a. A claim that recites the end-result product of a process (as opposed to a series of process steps that produce the result) is intrinsically broad, because it would cover any and all ways of achieving the result. *See General Elec. Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 374 (1938). Indeed, MEMC asserted that SUMCO's low-defect silicon wafers infringed the

product claims of the '302 patent even though SUMCO made its wafers in accordance with the process of the Park/Samsung patent.

MEMC never even claimed to have made anything more than the bare minimum required by the claims, which is legally insufficient to establish enablement of the full scope of open-ended claims. *See In re Wright*, 999 F.2d 1557, 1562 (Fed. Cir. 1993). The expansive breadth of MEMC's asserted claims encompass not just what the inventors alleged had been created (a worthless 24 or 30 mm band of low-defect silicon), but the widely desired end-product of a wafer comprised entirely of low-defect silicon, whether a diameter of 200 mm (standard in 1998) or 300 mm (standard today). Thus, even considering the inadmissible evidence, MEMC has never alleged that its silicon material was anywhere near a width commensurate with its open-ended claims covering entirely low-defect silicon wafers. *See O'Reilly v. Morse*, 56 U.S. 62, 122-24 (1854); *Amgen v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213-14 (Fed. Cir. 1991); *Harris Corp. v. Ixys Corp.*, 114 F.3d 1149, 1155-56 (Fed. Cir. 1997).

The Federal Circuit was unduly swayed by the contention of the inventors that the "design criteria" were sufficient to enable one of ordinary skill in the art to make the necessary adjustments to conventional equipment to produce the claimed wafer product. But, it failed to address the undisputable evidence that the "design criteria" (Voronkov's $v/G$ ratio and Shin-Etsu's slow-cooling theory) were known in the prior art. Furthermore,

patent rights are not awarded "for vague intimations of general ideas that may or may not be workable." *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997). The general statement that the specification need not disclose what is well known in the art is "merely a rule of supplementation, not a substitute for a basic enabling disclosure." *Id.*

Since the design criteria concepts were known and the equipment was known, it begs the question: where is the inventive concept? The inventors could point only to *known* design criteria concepts to be applied to *standard* equipment, alleging that one of ordinary skill in the art could make the necessary routine adjustments to produce low-defect silicon wafers. This is tantamount to saying that the invention itself was within the ordinary skill in the art. However, it is beyond dispute that despite the knowledge of Voronkov's critical *v*/G ratio for more than 15 years, despite the knowledge of the slow-cooling concept, and despite extensive research efforts, a process for making low-defect silicon wafers eluded the industry until the Park/Samsung process became available.

Accordingly, all of the evidence – including MEMC's evidence – clearly and convincingly establishes that the claimed wafers, if possible at all, could not be made without an enormous amount of non-routine experimentation. The Federal Circuit clearly erred in reversing the sound decision of the district court holding the '302 patent invalid for non-enablement.

## III. Enablement Law Provides the Key Constraint on Overly Broad Patent Claims and on Patents that only Disclose Theories that Have Not Been Reduced to Practice

The number of patent applications has surged in the last decade, [14] and the number of patent lawsuits has likewise dramatically risen, [15] with some industries such as the semiconductor industry particularly hard hit. [16] As part of its efforts to understand the problems within the patent system, the FTC identified a "poor quality or questionable patent" as one that "contains claims that are likely

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[14] The straining of the PTO's limited resources has led to a substantial backlog. United States Government Accountability Office, *Hiring Efforts Are Not Sufficient to Reduce the Patent Application Backlog*, http://www.gao.gov/new.items/d071102.pdf (Sept. 2007).

[15] Between 1994 and 2004, the district courts have seen a 90 percent increase in the number of filed patent cases. *See* L. Mecham, Admin. Office of the U.S. Courts, Archive of Annual Reports, http://www.uscourts.gov/judbususc/judbus.html (Judicial Business of the United States Courts tbl. C-2A (1997-2004)).

[16] "There is no question that [abusive patent practice] is a widespread and extremely serious problem in the semiconductor, computer, and telecommunications industries." Mark A. Lemley, *Testimony of Mark A. Lemley, Stanford Law School before the Senate Committee on the Judiciary* (June 14, 2005), http://judiciary.senate.gov/testimony.cfm?id=1535&wit_id=4352; *see also* Mark A. Lemley, *Ten Things To Do About Patent Holdup of Standards (And One Not To)*, 47 B.C. L. Rev. 149, 150-52 (2007).

overly broad."[17] However, current law, properly understood and applied, provides potentially powerful means to curb the abusive practice of overly broad patent claiming that obstructs technical innovation and imposes unjustified costs on legitimate innovators – substantively under the "enablement" requirement of 35 U.S.C. § 112 and procedurally through the summary judgment procedure. The lower courts and the PTO need guidance in curbing the pervasive practice of overly broad patent claiming through the legal limitation requiring enablement of the full scope of the patent claim.

The requirement that an inventor must provide a written specification that enables the claimed invention lies at the very "foundation of the power to issue the patent." *Grant v. Raymond*, 31 U.S. 218, 247 (1832). Without any contemporary direction from this Court, enablement law has inappropriately been applied as a case-by-case factual inquiry even though enablement is ultimately a legal question. In the Federal Circuit, enablement law currently varies across technologies[18] and incompletely addresses the issue

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[17] A Report by the Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy*, http://www.ftc.gov/os/2003/10/innovationrpt.pdf, at 5 (Oct. 2003).

[18] For example, one study recites that the Federal Circuit has imposed stringent enablement requirements on biotechnology patents that do not show up in other technical disciplines. Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology Specific?*, 17 Berkeley Tech. L.J. 1155, 1156-57 (2002).

of claim breadth and real-world evidence of an actual reduction to practice.

Patent disclosures must be reasonably commensurate with the monopoly benefits conferred. *O'Reilly*, 56 U.S. at 122-24; *In re Fisher*, 427 F.2d 833, 839 (C.C.P.A. 1970) (claim scope must be commensurate with the scope of what the patentee has given the public through an enabling disclosure). "To be enabling, the specification of the patent must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation.'" *Genentech, Inc.*, 108 F.3d at 1365. Thus, enablement is the primary constraint on patent claims with undue breadth, *i.e.*, dominant claims that encumber innovation rather than promote the progress of science. Yet, patent claiming practice continues to exhibit a "contemporary obsession with patent claim scope." [19] This is further exacerbated by the increasing complexity of technology.

In this case, a major gap lies between the disclosure and the scope of claims obtained based on that disclosure. Clear guidance is needed to ensure that courts consistently require an adequate level of disclosure such that the full scope of the claims is enabled. The broad claiming of a desired

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[19] Mark D. Janis, *On Courts Herding Cats: Contending with the "Written Description" Requirement (and Other Unruly Patent Disclosure Doctrines)*, 2 Wash. U. J.L. & Pol'y 55, 57 (2000).

result based on conjecture about how to achieve that result should never be allowed to substitute for an enabling disclosure, particularly when that guess-work is later conclusively discredited. MEMC's open-ended claiming of the low-defect silicon wafer product based on the unproven and debunked slow-cooling theory is the epitome of over-broad patent claiming.

When the PTO grants a patent, the patent holder obtains an economically valuable and legally powerful right to prevent others from making, using, and selling the invention. A prospective patent owner is motivated to seek patent claims very broadly so that valuable technology is encompassed by the claims.[20] The *quid pro quo* of patent protection is sufficient disclosure to place the claimed invention into the hands of the public. *Brenner v. Manson*, 383 U.S. 519, 534-35 (1966). The consideration an inventor gives in return for a patent "is the benefit which he confers upon the public by placing in their hands a means through the use of which their wants may be supplied." *Id.*

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[20] *See* Robert P. Merges, *On the Complex Economics of Patent Scope*, 90 Colum. L. Rev. 839, 839-840 (1990); Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. Rev. 63, 107-108 (2004) ("One of the most egregious abuses of continuation applications . . . [is] to broaden those claims to cover inventions that may or may not be supported in the initial disclosure . . . ."); Jay P. Kesan, *Carrots and Sticks to Create a Better Patent System*, 17 Berkeley Tech. L.J. 763, 765 (2002).

The breadth of claims is statutorily constrained by the requirement that an inventor must provide an adequate written description that actually warrants receipt of such broad patent rights. Anything less than a "full, clear, concise, and exact" disclosure that adequately teaches the patented invention to those skilled in the relevant art deprives the public of a meaningful inventive concept, while unjustly rewarding the patentee with a monopoly. *See* 35 U.S.C. § 112. The enablement requirement ensures that "public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims." *Nat'l Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195-96 (Fed. Cir. 1999).

The enablement provision also ensures that the inventor is actually in possession of the invention claimed. Because a prospective patentee cannot stake claim to a desired product or process without placing inventive technology in the hands of the public, the prospective patentee must first actually invent the technology by developing sufficient details to make it work.[21] For example, because no

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[21] The anticipation and obviousness doctrines prevent adequately described technology from being removed from the public where that technology already is known in the prior art or merely an obvious variation of what is known. The enablement requirement restricts prospective patentees from claiming a valuable, non-obvious technology by setting forth in the patent specification the information needed to practice the invention to a degree reasonably commensurate with the breadth of the claims. *See* Donald S. Chisum,

one could describe how to create a perpetual motion machine or a 100% pure silicon wafer without even atomic level defects, no one could validly claim that desired object. Similarly, when the prospective patentee seeks to lay claim to a desirable technology before making the technology, the prospective patentee may not know the information necessary to actually practice the invention. One can hardly teach what one does not know.

The enablement analysis used by the Federal Circuit employs the oft-cited *Wands* factors: (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). These factors do not adequately capture the requirements of this Court's enablement precedent.

Importantly, the *Wands* factors do not capture the role of an actual reduction to practice – and conversely, failures to produce the claimed technology – that provide real-world enablement evidence as opposed to a battle between expert opinions. The results of this Court's decisions that have addressed the enablement requirement often

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Comment, *Anticipation, Enablement and Obviousness: An Eternal Golden Braid*, 58 AIPLA Q.J. 57 (1987).

turned on, or were heavily influenced by, the fact that the patented technology was actually made and used. *See Eibel Process Co.*, 261 U.S. at 65-66; *Minerals Separation, Ltd.*, 242 U.S. at 270-71; *Loom Co.*, 105 U.S. at 586-87. In addition, this Court has invalidated patent claims for non-enablement due to the undue breadth of the claims in two cases, *O'Reilly*, 56 U.S. at 122-24 and *Incandescent Lamp Patent*, 159 U.S. 465, 474-75 (1895), and the lack of disclosure in the patent specification of the key principle necessary to successfully practice the invention in another, *Permutit Co. v. Graver Corp.*, 284 U.S. 52, 57-60 (1931).

The Patent Act mandates that the scope of protection afforded an invention be coextensive with the scope of the description provided in the patent. Public trust in the patent system requires that the extent of patent protection be commensurate with the disclosed inventive contribution and that the courts vigorously and consistently enforce this requirement. This Court's intervention is needed to restore that public trust.

## IV. The Well-Developed Record in this Case Presents an Ideal Opportunity to Decide the Important Substantive Patent and Procedural Issues

The record here presents an ideal vehicle for this Court to articulate: 1) how broad patent claims should be analyzed for compliance with the enablement requirement, and 2) how legal questions of invalidity should be resolved where

summary judgment is opposed by expert or inventor declarations opining on the ultimate legal conclusion.

First, the district court issued a detailed 54-page published opinion holding the '302 patent invalid for non-enablement on summary judgment. As in *KSR*, the district court's opinion demonstrates that the validity challenge to this patent is substantial and that the facts are sufficiently well developed to provide this Court with a clear and detailed record.

Second, this case presents an ideal opportunity to review both the substantive enablement issue and the procedural summary judgment issue. Both are crucial issues of sweeping importance: the PTO is deluged with patent applications with an increasing tendency to advance overly broad claims, and the district courts are inundated with patent litigation asserting similarly broad patent claims. In particular, this case presents several important enablement considerations. This case includes open-ended product claims of "quite expansive" breadth, unsupported inventor opinions, real-world evidence of failures to make the claimed invention, the licensing of alternative technology, and the lack of an actual reduction to practice. The lack of an actual reduction to practice and MEMC and industry failures over an extended period of time implicate a central enablement issue under this Court's patent jurisprudence. This issue is timely and important, particularly to patents sought by non-manufacturing patent applicants as well as

patent applicants that aggressively seek to patent before achieving an actual reduction to practice.

Third, while the technology is complex, the facts critical to this Court's review are undisputed. Only one independent patent claim is in issue. The claim construction issued by the district court was not appealed. The district court's ruling that there was no actual reduction to practice to establish an earlier priority date was not appealed. The district court's *Daubert* ruling holding the testing evidence inadmissible was affirmed. The Federal Circuit's decision to vacate the invalidity ruling was based only on a perceived genuine issue of material fact raised by inventor declarations that were acknowledged to be uncorroborated, thus isolating this issue for review by this Court.

## CONCLUSION

For the foregoing reasons, SUMCO respectfully requests that its petition for writ of certiorari be granted.

Respectfully submitted,

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January 15, 2008

# APPENDIX

## APPENDIX A

## UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

**Nos. 2006-1305, 2006-1326**

**[Decided September 20, 2007]**

MEMC ELECTRONIC MATERIALS, INC., Plaintiff-Appellant,

v.

MITSUBISHI MATERIALS SILICON CORPORATION, MITSUBISHI SILICON AMERICA CORPORATION, SUMITOMO MITSUBISHI SILICON CORPORATION (also known as Sumco), SUMCO USA CORPORATION (also known as Sumco USA), and SUMCO USA SALES CORPORATION (also known as Sumco USA Sales), Defendants-Cross Appellants.

Before SCHALL, Circuit Judge, PLAGER, Senior Circuit Judge, and DYK, Circuit Judge.

## OPINION

PLAGER, Senior Circuit Judge.

In this patent infringement case, once again on appeal to this court, MEMC Electronic Materials, Inc. ("MEMC"), a supplier of silicon wafers to the semiconductor industry, filed suit in the United States District Court for the Northern District of California against Mitsubishi Materials Silicon Corporation, Mitsubishi Silicon America Corporation, Sumitomo Mitsubishi Silicon Corporation, SUMCO USA Corporation, and SUMCO USA Sales Corporation (collectively, "SUMCO"). MEMC alleged that, inter alia, SUMCO actively induced infringement of U.S. Patent No. 5,919,302 (the "'302 patent"), assigned to MEMC, and SUMCO asserted affirmative defenses of non-infringement and invalidity of the patent. On remand, following an earlier appeal, the trial court on cross-motions for summary judgment held that the asserted claims of the '302 patent were invalid for lack of enablement and they were not invalid for anticipation or obviousness. With respect to the issue of infringement, the trial court granted SUMCO's motion to exclude the expert report and testimony of MEMC's expert witness and granted SUMCO's motion for summary judgment that its products did not infringe the asserted claims of the '302 patent.

We conclude that the trial court did not abuse its discretion in excluding the expert report and testimony of MEMC's expert witness, and thus on this record we *affirm* the judgment of non-infringement. However, because there are genuine issues of material fact on the issue of enablement, we *vacate* the trial court's

summary judgment of invalidity for lack of enablement. SUMCO's cross-appeal relating to its affirmative defenses of anticipation and obviousness is *dismissed*.

## BACKGROUND

The '302 patent purports to disclose a method for producing semiconductor-grade single crystal silicon wafers that are substantially free of agglomerated vacancy intrinsic point defects.[1] Prior art methods often resulted in such defects, which can severely impact the yield of the silicon wafers.

The only independent claim at issue is claim 1, which claims the silicon wafer itself, not the method for producing it. Claim 1 requires the wafer to have a "first axially symmetric" vacancy-dominated region that is "substantially free of agglomerated vacancy intrinsic point defects." '302 patent col.23 ll.18-21. The patent expressly defines "substantially free of agglomerated intrinsic point defects" as "a concentration of agglomerated defects which is less than the detection limit of these defects, which is currently about $10^3$ defects/$cm^3$." *Id.* col.15 ll.46-49.

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[1] Single crystal silicon typically contains two types of intrinsic point defects: vacancy point defects, which occur when single silicon atoms are missing from the crystal lattice, and interstitial point defects, which occur when there are extra silicon atoms. Agglomerated defects result when point defects of the same type combine to form large vacancies or masses.

MEMC filed suit against SUMCO in 2001, alleging that SUMCO was liable for direct infringement of the '302 patent by selling and offering to sell its silicon wafers to Samsung Austin Semiconductor. MEMC further alleged that SUMCO induced infringement by Samsung Austin. During discovery, MEMC submitted the expert report of Dr. Mule'Stagno, an MEMC employee, who tested the accused SUMCO wafers and concluded that forty-three out of forty-five tested wafers infringed the claims of the '302 patent. SUMCO filed a motion to exclude the expert report and testimony of Dr. Mule'Stagno with regard to the issue of infringement on the ground that they were inadmissible under Federal Rule of Evidence 702 and the standards set forth in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). In a March 2004 ruling, the trial court gave MEMC the opportunity to cure the alleged defects in Dr. Mule'Stagno's expert report by submitting objective evidence that his testing methodology was generally accepted by at least a recognized minority of scientists in his field.[2] MEMC subsequently submitted additional declarations from Dr. Mule'Stagno.

In a separate March 2004 decision, without reaching the issue of whether the accused wafers are covered by the claims of the '302 patent, the trial court granted SUMCO's motion for summary judgment that SUMCO was not liable for direct infringement or inducement of infringement. After the trial court

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[2] MEMC Elec. Materials, Inc. v. Mitsubishi Materials Silicon Corp., No. 01-4925, slip op. at 11-12 (N.D. Cal. Mar. 1, 2004) (order).

entered final judgment of non-infringement, MEMC appealed to this court. We affirmed the trial court's judgment with respect to direct infringement because MEMC presented no evidence that SUMCO sold or offered to sell the accused wafers in the United States. *MEMC Elec. Materials, Inc. v. Mitsubishi Materials Silicon Corp.*, 420 F.3d 1369, 1376-77 (Fed. Cir. 2005). We concluded, however, that there were genuine issues of material fact regarding whether SUMCO induced infringement on the part of Samsung Austin, and we remanded for further proceedings on that issue. *Id.* at 1379-80.

On remand, SUMCO filed a second motion to exclude Dr. Mule'Stagno's expert report and testimony on *Daubert* grounds. This time the trial court granted the motion, finding that the additional declarations submitted by Dr. Mule'Stagno failed to provide objective verification of his testing methodology.[3] The parties also filed various motions for summary judgment, which the trial court decided without a hearing.[4] The trial court granted SUMCO's motion for summary judgment of non-infringement, concluding that the wafers supplied by SUMCO to Samsung Austin did not literally infringe the claims of the '302

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[3] *MEMC Elec. Materials, Inc. v. Mitsubishi Materials Silicon Corp.*, No. 01-4925 (N.D. Cal. Feb. 24, 2006) (order).

[4] *MEMC Elec. Materials, Inc. v. Mitsubishi Materials Silicon Corp.*, No. 01-4925, 2006 WL 463525 (N.D. Cal. Feb. 24, 2006) (order).

patent.[5] The trial court also granted SUMCO's motion for summary judgment that the claims are invalid under 35 U.S.C. § 112, ¶ 1 for lack of enablement. Finally, the trial court granted MEMC's motion for summary judgment that the claims are not invalid under 35 U.S.C. § 102 for anticipation or under 35 U.S.C. § 103 for obviousness. The trial court entered final judgment on February 27, 2006.

MEMC challenges the trial court's ruling to exclude Dr. Mule'Stagno's expert report and testimony and appeals the non-infringement judgment. MEMC also appeals the trial court's judgment of invalidity due to lack of enablement. SUMCO has filed a "conditional cross-appeal" addressing anticipation and obviousness that is triggered if we do not affirm the judgment of non-infringement. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

## DISCUSSION

### 1. Exclusion of Expert Testimony

The trial court excluded Dr. Mule'Stagno's expert report and declarations regarding infringement because MEMC failed to demonstrate that his testing methodology was scientifically reliable for establishing that SUMCO's wafers have "axially symmetric" vacancy-dominated regions that are "substantially free of agglomerated vacancy intrinsic point defects" as required by the claims. We review the trial court's

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[5] The trial court on remand never reached the issue of inducement.

exclusion of expert scientific testimony for abuse of discretion. *Kennedy v. Collagen Corp.*, 161 F.3d 1226, 1227 (9th Cir. 1998).

MEMC contends that the various tests performed by Dr. Mule'Stagno are conventional industry tests for analyzing the physical characteristics of silicon wafers. SUMCO does not disagree, but responds that MEMC did not provide objectively reliable evidence that the tests may be used to show what MEMC alleges they show, i.e., that the accused wafers satisfy the claim limitations. In particular, SUMCO argues that Dr. Mule'Stagno cannot show whether a wafer has fewer than 1000 defects per cubic centimeter—the patentees' definition of "substantially free of agglomerated intrinsic point defects"—since the detection limit of the test on which he relies is 3300 defects per cubic centimeter. Dr. Mule'Stagno asserted that he reduced the detection limit by looking at multiple views through the microscope, but SUMCO responds that MEMC has not provided verification that this modified methodology is scientifically reliable. SUMCO also challenges Dr. Mule'Stagno's decision to disregard certain test results as noise or contamination and his assumption, in lieu of actual evidence, that the wafers are axially symmetric.

Under *Daubert* and Rule 702, expert opinion evidence must be both reliable and relevant to the issue before the trial court. *Daubert*, 509 U.S. at 594-95. While the various tests carried out by Dr. Mule'Stagno may be commonly used in the industry to examine defects in silicon wafers, the record indicates that the results of those tests cannot prove that all the claim limitations are met. To the extent that Dr.

Mule'Stagno varied the standard testing methodology, the record supports the trial court's conclusion that such modifications rendered the tests unreliable. Although the issue is a close one, under our deferential standard of review we cannot say the trial court abused its discretion in concluding that Dr. Mule'Stagno's expert report and testimony relating to infringement failed to meet the standards of relevance and reliability required by Rule 702.

### 2. Non-infringement

In the absence of Dr. Mule'Stagno's expert report and related declarations, which were properly excluded by the trial court, the evidence relied upon by MEMC is insufficient to create genuine issues of material fact with regard to infringement. MEMC points to various articles and deposition testimony in which SUMCO employees referred to the company's wafers as "defect-free" or made of "pure silicon." MEMC also cites quality control data from SUMCO allegedly documenting wafers with zero defects. Yet none of this evidence is probative of whether the accused SUMCO wafers are "substantially free of agglomerated vacancy intrinsic point defects" as that phrase was construed by the trial court and defined in the '302 patent, i.e., whether the wafers have fewer than 1000 agglomerated vacancy defects per cubic centimeter. Accordingly, we affirm the trial court's grant of summary judgment of non-infringement in SUMCO's favor.

### 3. Enablement

The enablement requirement is satisfied if the patent teaches a person skilled in the art at the time the patent application was filed how to make the claimed invention without undue experimentation. *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988). Enablement is a legal conclusion based on underlying factual considerations. *Id.* at 737. The party alleging invalidity bears the burden of proving by clear and convincing evidence that the claims are invalid for lack of enablement. *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1359 (Fed. Cir. 1998).

The parties' arguments focus on design of the "hot zone," a part of a specially designed furnace known as a crystal puller which is commonly used to produce single crystal silicon. SUMCO submitted to the trial court the declarations of three expert witnesses. They opined that hot zone design is critical to the manufacturing of silicon wafers and requires sophisticated modeling and simulation. In their view, the hot zone description in the '302 patent is too generic to provide the necessary guidance for designing a hot zone that would produce the claimed silicon wafers without undue experimentation.

MEMC responded with declarations from two of the named inventors of the '302 patent and one from Dr. Mule'Stagno. The inventors explained that the patent sets forth design criteria for controlling three crystal growth parameters. According to the inventors, a person skilled in the art in 1998 when the application was filed would have had the knowledge and ability to modify an existing crystal puller and hot zone using

commonly available modeling techniques to achieve the design criteria described in the patent. They noted that, as indicated in the patent, necessary modifications will vary depending on the particular make and model of the crystal puller, and therefore it is the design criteria for controlling the growth parameters that are important rather than a specific hot zone design.

The inventors further stated that, prior to filing their patent application, they made adjustments to an existing hot zone and grew silicon crystal ingots according to the design criteria in the patent. Both the inventors and Dr. Mule'Stagno asserted in their declarations that wafers obtained from those ingots fall within the scope of the patent claims.

The trial court granted summary judgment in SUMCO's favor, concluding that the claims of the '302 patent are invalid for lack of enablement because the patent does not disclose a specific hot zone design, which the court found was essential to producing the claimed silicon wafers. While we appreciate the trial court's effort in analyzing a difficult technical issue, we are unable to agree that summary judgment on the issue of enablement was appropriate. When ruling on SUMCO's motion for summary judgment, and in determining whether there were genuine issues of material fact requiring trial, the law mandates that the trial court view the evidence in the light most favorable to the nonmoving party, MEMC, and resolve any evidentiary doubts in that party's favor. *See Johns Hopkins*, 152 F.3d at 1359. In this case, the declarations of the MEMC witnesses create genuine issues of material fact as to whether undue

experimentation would be required to design a hot zone to achieve the crystal growth conditions described in the patent and whether such conditions would result in silicon wafers covered by the patent claims.

Moreover, to the extent the trial court failed to consider the declarations of the MEMC witnesses because they were not corroborated by independent evidence, that was error. The MEMC inventors' declarations were not asserted in an attempt to prove an actual reduction to practice for the purpose of establishing priority of invention, in which case corroboration would be required, *see Cooper v. Goldfarb*, 154 F.3d 1321, 1330 (Fed. Cir. 1998). Rather, evidence that the inventors had practiced the invention was submitted by MEMC in response to SUMCO's argument that the claims were not enabled because the claimed silicon wafers could not be produced without undue experimentation. There is no corroboration requirement for expert testimony asserted to defend *against* an invalidity challenge. *See TypeRight Keyboard Corp. v. Microsoft Corp.*, 374 F.3d 1151, 1159 (Fed. Cir. 2004) ("Corroboration is required of any witness whose testimony alone is asserted *to invalidate a patent*." (emphasis added)).

For the foregoing reasons, we vacate the trial court's grant of summary judgment of invalidity due to lack of enablement.

**4. SUMCO's Cross-Appeal**

In its conditional cross-appeal, SUMCO argues that if the trial court's non-infringement judgment is not affirmed, we should vacate the trial court's summary

judgment that the patent claims are not invalid for anticipation or obviousness because the trial court applied the same reasoning in both rulings. This cross-appeal is improper. As this court has made clear, "[i]t is only necessary and appropriate to file a cross-appeal when a party seeks to enlarge its own rights under the judgment or to lessen the rights of its adversary under the judgment." *Bailey v. Dart Container Corp. of Mich.*, 292 F.3d 1360, 1362 (Fed. Cir. 2002). Here the trial court entered a judgment of invalidity as to all the asserted claims; the basis for that ruling was lack of enablement. SUMCO's arguments that the claims are anticipated or would have been obvious are simply alternate grounds for affirming the trial court's judgment of invalidity. *See TypeRight*, 374 F.3d at 1157. We therefore dismiss the cross-appeal for lack of jurisdiction and order that SUMCO's reply brief be stricken from the record.

We treat SUMCO's arguments regarding anticipation and obviousness as arguments in support of the judgment of invalidity on other grounds. However, SUMCO asks us to consider those arguments only if the non-infringement judgment is not affirmed. Because we affirm that judgment, we need not address anticipation and obviousness.

## CONCLUSION

The trial court did not abuse its discretion in excluding Dr. Mule'Stagno's expert report and testimony on the issue of infringement, and the trial court's summary judgment of non-infringement is affirmed. The trial court's summary judgment of invalidity for lack of enablement is vacated. SUMCO's

cross-appeal is dismissed. Since the invalidity issues were raised only as affirmative defenses, in view of our affirmance of the district court's non-infringement determination, no remand for further proceedings is necessary. *See Cardinal Chem. Co. v. Morton Int'l, Inc.*, 508 U.S. 83, 93-94 (1993).

## COSTS

Each party shall bear its own costs.

## APPENDIX B

**UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA**

**No. C 01-4925 SBA**
***(Related to Case No. C 05-2133 SBA)***

**[Filed February 24, 2006]**

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| MEMC ELECTRONIC MATERIALS, INC., Plaintiff, | ) |
| v. | ) |
| MITSUBISHI MATERIALS SILICON CORPORATION, et al., Defendants. | ) |

**ORDER**

[Docket No. 499, 505, 544, 572, 577, 667]

This matter comes before the Court on Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity of US Patent No. 5,919,302 [Docket No. 505]; Defendants' Motion for Summary Judgment of Zero Damages Because of No Inducement under 35 U.S.C. § 271 (b) [Docket No. 499]; Plaintiff's Motion for Summary Judgment Against Defendants' Invalidity Defense [Docket No. 544]; Plaintiff's Motion for

Summary Judgment Against Defendants for Active Inducement of Infringement Under 35 U.S.C. § 271(b) [Docket No. 667]; Defendants' Objections to Plaintiff's Evidence Submitted in Support of its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense [Docket No. 577]; and Defendants' Objections to Plaintiff's Evidence Submitted in Opposition to Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity [Docket No. 572].

Having read and considered the arguments presented by the parties in the papers submitted to the Court, the Court finds this matter appropriate for resolution without a hearing. The Court hereby: (1) GRANTS IN PART AND DENIES IN PART Plaintiff's Motion for Summary Judgment Against SUMCO's Invalidity Affirmative Defense; (2) GRANTS IN PART AND DENIES IN PART Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity of U.S. Patent No. 5,919,302; (3) DENIES Plaintiff's Motion for Summary Judgment against Defendants for Active Inducement of Infringement under 35 U.S.C. § 271(b); (4) DENIES AS MOOT Defendants' Motion for Summary Judgment of Zero Damages Because of No Inducement under 35 U.S.C. § 271(b); (5) SUSTAINS IN PART AND OVERRULES IN PART Defendants' Objections to Plaintiff's Evidence Submitted in Support of its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense; and (6) SUSTAINS IN PART AND OVERRULES IN PART Defendants' Objections to Plaintiff's Evidence Submitted in Opposition to Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity.

## BACKGROUND

In this patent infringement suit, Plaintiff MEMC Electronics Materials, Inc. ("MEMC") has accused defendants Mitsubishi Materials Silicon Corp., Mitsubishi Silicon America Corp., Sumitomo Mitsubishi Silicon Corp., SUMCO USA Corp. and SUMCO USA SALES Corp. (collectively, "SUMCO") of actively inducing Samsung Austin Semiconductor, L.L.C.'s ("SAS") infringement of U.S. Patent No. 5,919,302[1] (the "'302 patent").[2]

MEMC is a supplier of silicon wafers to the semiconductor industry. SUMCO also produces single crystal silicon wafers for use in the fabrication of semiconductors.

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[1] MEMC is the assignee of record of the '302 Patent.

[2] MEMC originally claimed in its Complaint that SUMCO directly infringed, contributed to the infringement of, and induced infringement by others of the '302 Patent. However, on March 16, 2004, this Court granted SUMCO's Motion for Summary Judgment of Zero Damages, holding that SUMCO did not infringe the '302 Patent under any of the three theories advanced by MEMC. MEMC appealed with respect to the issues of direct infringement and active inducement of infringement. The Federal Circuit upheld the Court's ruling with respect to direct infringement, but reversed this Court with respect to the issue of active inducement of infringement. Accordingly, active inducement is the sole infringement issue left to be determined.

## A. The '302 Patent

The '302 Patent, which is entitled "Low Defect Density Vacancy Dominated Silicon," was issued on July 6, 1999 and claims an invention related to the preparation of semiconductor grade single crystal silicon, which is used, in wafer form, in the manufacture of electronic components such as integrated circuits. *See* 302:1:9-16.[3]

Single crystal silicon, which is the starting material for most processes for the fabrication of semiconductor electronic components, is commonly prepared by what is known as the "Czochralski" method. *See* 302:1:17-37. In this method, polycrystalline silicon ("polysilicon") is charged to a crucible and melted, a seed crystal is brought into contact with the molten silicon, and a single crystal is grown by slow extraction. *Id.* After formation of a neck is complete, the diameter of the crystal is enlarged by decreasing the pulling rate and/or the melt temperature until the desired or target diameter is reached. *Id.* The cylindrical main body of the crystal, which has an approximately constant diameter, is then grown by controlling the pull rate

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[3] The asserted claims from the '302 Patent are cited herein as "XXX.YY" with "XXX" denoting the patent number and "YY" denoting the claim number (*e.g.*, Claim 6 of the '302 Patent is "302.6.") or "XXX.YY:ZZ" with "XXX" denoting the patent number, "YY" denoting the claim, and "ZZ" denoting the line (*e.g.*, Claim 6 of the '302 Patent at lines 1 through 50 is "028.6.1-50."). Citations to the specifications for the '302 Patent are cited herein as "XXX:YY:ZZ" with "XXX" denoting the patent number, "YY" denoting the column, and "ZZ" denoting the line (*e.g.*, column 1, lines 5 through 8 of the '302 Patent is "302:1:5-8.").

and the melt temperature while compensating for the decreasing melt level. *Id.* Near the end of the growth process but before the crucible is emptied of molten silicon, the crystal diameter is reduced gradually to form an end-cone. *Id.* Typically, the end-cone is formed by increasing the crystal pull rate and heat supplied to the crucible. *Id.* When the diameter becomes small enough, the crystal is then separated from the melt. *Id.*

Depending on the method used to produce the crystal, certain defects can form in the crystal growth chamber as the crystal cools after solidification. *See* 302:1:38-55. Such defects arise, in part, due to the presence of an excess *(i.e.* a concentration above the solubility limit) of intrinsic point defects, which are known as "vacancies" and "self-interstitials." *Id.* Silicon crystals grown from a melt are typically grown with an excess of one or the other type of intrinsic point defect, either crystal lattice vacancies ("V") or silicon self-interstitials ("I"). *Id.* The type and initial concentration of these point defects in the silicon are determined at the time of solidification and, if these concentrations reach a level of critical supersaturation in the system and the mobility of the point defects is sufficiently high, a reaction, or an agglomeration event, will likely occur. *Id.* Agglomerated intrinsic point defects in silicon can severely impact the yield potential of the material in the production of complex and highly integrated circuits. *Id.*

Vacancy-type defects are recognized to be the origin of such observable crystal defects as: D-defects, Flow Pattern Defects ("FPDs"), Gate Oxide Integrity ("GOI") Defects, Crystal Originated Particle ("COP") Defects,

crystal originated Light Point Defects ("LPDs"), as well as certain classes of bulk defects observed by infrared light scattering techniques such as Scanning Infrared Microscopy and Laser Scanning Tomography. *See* 302:1:56-67. Vacancy-type defects also include defects which act as the nuclei for ring oxidation induced stacking defaults ("OISFs"). *Id.*

Defects relating to self-interstitials are less well-studied. *See* 302:2:1-7. They are generally regarded as being low densities of interstitial-type dislocation loops or networks. *Id.* Such defects are widely recognized to be the cause of device failures usually associated with leakage problems. *Id.*

The '302 Patent discloses a process specifying initial growth conditions and the temperature range of the manufacturing process. The asserted claims of the '302 Patent are claims 1-6 and 9-12. Claim 1 is the only asserted independent claim. It reads as follows:

> A single crystal silicon wafer having a central axis, a front side and a back side which are generally perpendicular to the central axis, a circumferential edge, and a radius extending from the central axis to the circumferential edge of the wafer, the wafer comprising a first axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm.

*See* 302.1.

Thus, every asserted claim requires the following elements:

- a single crystal silicon wafer;
- a first axially symmetric region [of the wafer] in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects; and
- a first axially symmetric region that comprises the central axis or has a width of at least about 15 mm.

The dependent claims (claims 2-6 and 9-12) additionally require the following elements:

- a second axially symmetric region in which silicon self interstitial atoms are the predominant intrinsic point defect and which is substantially free of agglomerated silicon self-interstitial intrinsic point defects (claims 2, 4, 6, and 10);
- a first axially symmetric region that is at least about 15% of the radius (claims 3 and 4);
- a first axially symmetric region that is at least about 25% of the radius (claims 5 and 6);
- a first axially symmetric region that comprises the central axis (claims 9 and 10);

- a wafer with an oxygen content less than about 13 PPMA; and

- a wafer with an oxygen content less than about 11 PPMA.

Pursuant to this Court's *Markman* Order, the term "wafer" means "a thin, generally cylindrical, slice of semiconductor material used as a base for an electronic component or circuit." The term "a first axially symmetric region" means "a region that is symmetric about the central axis of the wafer." The term "substantially free of agglomerated vacancy [or interstitial] defects" means "a concentration of such agglomerated defects which is less than the detection limit of these defects, which is currently about 1000 defects/cm3." The term "agglomerated vacancy intrinsic point defects" means "defects caused by the reaction in which vacancies agglomerate to produce D-defects, flow pattern defects, gate oxide integrity defects, crystal originated particle defects, crystal originated light point defects, and other such vacancy related defects." Finally, "agglomerated silicon self-interstitial intrinsic point defects" means "defects caused by the reaction in which self-interstitials agglomerate to produce dislocation loops and networks, and other such self-interstitial related defects."

**B. Procedural Background**

On December 14, 2001, MEMC filed suit against SUMCO seeking injunctive and monetary relief from SUMCO's willful infringement of the '302 Patent.

On January 31, 2002, SUMCO filed its answer, asserting numerous affirmative defenses, including the defenses of lack of enablement, anticipation, and obviousness.

On July 10, 2002, SUMCO served MEMC with its Preliminary Invalidity Contentions.

On May 1, 2003, the Court held a claim construction hearing for the purpose of construing the claims of the '302 Patent.

On July 3, 2003, SUMCO served MEMC with its Final Invalidity Contentions. In its Final Invalidity Contentions, SUMCO identified 43 references or categories of references it alleged anticipated or rendered obvious the asserted claims.

On October 17, 2003, MEMC served its expert report of Luciano Mule'Stagno (the "Expert Report"). The Expert Report consisted of the results of testing Mule'Stagno performed on silicon wafers produced during discovery by SUMCO. It comprised seven pages of narrative opinion and almost 500 pages of materials relating to testing methodology and results. Based upon the testing performed and described in the Expert Report, Mule'Stagno concluded that 43 of the 45 tested wafers infringed the '302 Patent and U.S. Patent No. 6,287,380 (the "'380 Patent") literally and under the doctrine of equivalents. Up until the disclosure of the Report, MEMC had not alleged infringement of the '380 Patent.

On November 13, 2003, this Court granted in part and denied in part MEMC's Motion to Strike

Defendants' Preliminary and Final Invalidity Contentions. The Court found that SUMCO had properly complied with Patent Local Rule 3-3(b) with respect to its Preliminary and Final Invalidity Contentions. The Court therefore denied MEMC's Motion to Strike Defendants' Preliminary Invalidity Contentions. However, the Court did find that SUMCO was in violation of the "specificity requirements of Patent Local Rule 3-3(c) because the claim charts submitted by Defendants in their Preliminary and Final Invalidity Contentions [were] not detailed, claim-by-claim, element-by-element claim charts." SUMCO was required to serve new Final Invalidity Contentions with new claim charts, which it did by the Court-ordered deadline

On December 8, 2003, SUMCO filed a Motion to Exclude the Expert Report and Testimony of Plaintiff's Proposed Expert Luciano Mule'Stagno and to Preclude Plaintiff's Infringement Claims ("SUMCO's First Motion to Exclude Expert").

On January 12, 2004, SUMCO served its Revised Final Invalidity Contentions ("Revised FICs"). In the Revised FICs, SUMCO narrowed the number of references at issue from 43 references down to 14.

On March 1, 2004, the Court issued an Order granting SUMCO's First Motion to Exclude Expert. The Court granted SUMCO's motion to exclude Mule'Stagno's Expert Report and testimony to the extent that it related to infringement of the '380 Patent. The Court also granted SUMCO's motion to preclude MEMC from pursuing its claim of infringement under the doctrine of equivalents and

granted Defendants' motion to bar MEMC from offering any expert report or testimony that SUMCO has infringed the '302 Patent under the doctrine of equivalents. Additionally, the Court granted SUMCO's motion to strike the "claim charts" in Mule'Stagno's Expert Report but denied SUMCO's motion to preclude MEMC's infringement claims.

Pursuant to Federal Rule of Civil Procedure 26(a)(2)(C) and (e)(1), MEMC was given an opportunity to cure the defects in Mule'Stagno's Expert Report by providing objective verification of Mule'Stagno's methodology. In particular, MEMC was directed to show, via objective sources, what Mule'Stagno's tests were, what the results purported to show, and how the results were relevant to the conclusions. MEMC was also instructed to demonstrate, via objective sources, that Mule'Stagno's methodologies were generally accepted by or espoused by a recognized minority of scientists in the field.

In response to the Court's Order, on March 9, 2004, MEMC served SUMCO with the Second Declaration of Mule'Stagno. *See* Powers Decl. ISO Second Motion to Exclude Expert at Ex. 3. However, on March 16, 2004, before SUMCO had a chance to respond to the Second Declaration of Mule'Stagno, this Court granted SUMCO's motion for summary judgment of zero damages and specifically found that SUMCO was not liable for either direct infringement, contributory infringement, or active inducement of infringement. Accordingly, on April 22, 2004, the court entered a Judgment of Non-infringement. MEMC subsequently appealed.

On August 22, 2005, the Federal Circuit issued its decision on the appeal and held that, based on the fact that there was no evidence SUMCO directly sold the accused wafers in the United States, this Court did not err when in granted summary judgment of zero damages on the issue of direct infringement. However, the Federal Circuit held that this Court did err when it granted summary judgment with respect to inducement of infringement because it found that there were genuine issues of material fact with respect to whether SUMCO induced infringement of the '302 Patent on the part of Samsung Austin. Accordingly, the Federal Circuit remanded the case to this Court for further proceedings. Specifically, the Federal Circuit instructed this Court to determine if SAS directly infringes the '302 Patent by using SUMCO's wafers in the United States, and, if so, whether SUMCO actively induces SAS' infringement.

On November 4, 2005, SUMCO filed a Motion to Exclude the Expert Report and Testimony of Plaintiffs' Proposed Expert Luciano Mule'stagno ("Second Motion to Exclude Expert").

Also on November 4, 2005, SUMCO filed a Motion for Summary Judgment of Non-Infringement and Invalidity of U.S. Patent No. 5,919,302. In the Motion, SUMCO seeks summary judgment in its favor on the following grounds: (1) the accused wafers do not infringe the asserted claims of the '302 Patent; (2) the '302 Patent is invalid under 35 U.S.C. § 112 for lack of enablement; (3) the asserted claims of the '302 Patent are invalid under 35 U.S.C. § 102(a) and (b) as anticipated by prior art publications; and (3) the asserted claims of the '302 Patent are invalid under 35

U.S.C. § 102(e), (f), or (g) based upon the prior art reflected in U.S. Patent No. 6,045,610. Additionally, SUMC filed a renewed Motion for Summary Judgment of Zero Damages.

On December 6, 2005 MEMC filed its own Motion for Summary Judgment on Defendants' Invalidity Affirmative Defense. In the Motion for Summary Judgment on Defendants' Affirmative Defense, MEMC seeks summary judgment that the asserted claims of the '302 Patent satisfy the requirements of 35 U.S.C. §§ 102, 103, and 112. Also on December 6, 2005, MEMC filed a Motion for Summary Judgment Against Defendants for Active Inducement of Infringement Under 35 U.S.C. § 271(b) ("Motion for Summary Judgment for Active Inducement").

## LEGAL STANDARD

### I. Summary Judgment

Under Federal Rule of Civil Procedure 56, a court may properly grant a motion for summary judgment if the pleadings and materials demonstrate that there is "no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law." *Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986). A dispute about a material fact is genuine "if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242 (1986). Summary judgment may be granted in favor of a defendant on an ultimate issue of fact where the defendant carries its burden of "pointing out to the district court that there is an absence of evidence to support the nonmoving party's

case." *Celotex*, 477 U.S. at 325; *see Johnston v. IVAC Corp.*, 885 F.2d 1574, 1577 (Fed. Cir. 1989).

To withstand a motion for summary judgment, the non-movant must show that there are genuine factual issues which can only be resolved by the trier of fact. *Anderson*, 477 U.S. at 250. The nonmoving party may not rely on the pleadings but must present specific facts creating a genuine issue of material fact. *T. W. Elec. Serv. v. Pacific Elec. Contractors Ass'n*, 809 F.2d 626, 630 (9th Cir. 1987). The court's function, however, is not to make credibility determinations. *Anderson*, 477 U.S. at 249. The inferences to be drawn from the facts must be viewed in a light most favorable to the party opposing the motion. *T.W. Elec. Serv.*, 809 F.2d at 631.

It is not the task of the district court to scour the record in search of a genuine issue of triable fact. *Keenan v. Allan*, 91 F.3d 1275, 1279 (9th Cir. 1996). The nonmoving party has the burden of identifying with reasonable particularity the evidence that precludes summary judgment. *Id.* If the nonmoving party fails to do so, the district court may properly grant summary judgment in favor of the moving party. *See Carmen v. San Francisco Unified School District*, 237 F.3d 1026, 1028-29 (9th Cir. 2001) (even if there is evidence in the court file which creates a genuine issue of material fact, a district court may grant summary judgment if the opposing papers do not include or conveniently refer to that evidence). Although the district court has discretion to consider materials in the court file not referenced in the opposing papers, it need not do so. *Id.* at 1029. "The district court need not examine the entire file for evidence establishing a

genuine issue of fact." *Id.* at 1031. However, when the parties file cross-motions for summary judgment, the district court must consider all of the evidence submitted in support of both motions to evaluate whether a genuine issue of material fact exists precluding summary judgment for either party. *The Fair Housing Council of Riverside County, Inc. v. Riverside Two*, 249 F.3d 1132, 1135 (9th Cir. 2001).

A court may grant a summary judgment motion in a patent infringement case, as in any other case. *Avia Group Int'l, Inc. v. L.A. Gear Cal., Inc.*, 853 F.2d 1557, 1561 (Fed. Cir. 1988). In the context of a patent infringement case, the defendant may be granted summary judgment for non-infringement where the patent-holder's proof is deficient in meeting an essential part of the legal standard for infringement. *ASQ Technology, Inc. v. Fortrend Engineering Corp.*, 1995 WL 590360, at *2 (N.D.Cal. 1995). But "in considering the [summary judgment] motion, the court must view the evidence in the most favorable light to the non-movant and draw all reasonable inferences in the non-moving party's favor." *Tillotson, Ltd. v. Walbro Corp.*, 831 F.2d 1033, 1037 (Fed. Cir. 1987). "[A] literal infringement issue is properly decided upon summary judgment when no genuine issue of material fact exists, in particular, when no reasonable jury could find that every limitation recited in the properly construed claim either is or is not found in the accused device. *Bai v. L&L Wings, Inc.*, 160 F.3d 1350, 1353 (Fed. Cir. 1998) (citing *Cole v. Kimberly Clark Corp.*, 102 F.3d 524, 532 (Fed. Cir. 1996)).

Since summary judgment must be supported by "facts as would be admissible in evidence," *see* Fed. R.

Civ. P. 56(e), scientific evidence produced in support of or in opposition to a motion for summary judgment must meet the standards of relevance and reliability articulated in *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993). *See Seaboard Lumber Co. v. United States*, 308 F.3d 1283, 1301 (Fed. Cir. 2002). The Supreme Court in *Daubert* described this inquiry as follows:

> Faced with a proffer of expert scientific testimony . . . the trial judge must determine . . . whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.

509 U.S. at 590.

## II. Infringement

### A. Literal Infringement

A literal infringement analysis requires two separate steps. *Lacks Industries, Inc. v. McKechnie Vehicle Components USA, Inc.*, 322 F.3d 1335, 1341 (Fed. Cir. 2003); *Southwall Technologies, Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed. Cir. 1995). First, the asserted claims must be interpreted by the court as a matter of law to determine their meaning and scope. *Markman v. Westview Instruments Inc.*, 517 U.S. 370 (1996); *Lacks*, 322 F.3d at 1341. In the second

step, the trier of fact determines whether the claims as thus construed read on the accused product. *Lacks*, 322 F.3d at 1341. To establish literal infringement, every limitation set forth in a claim must be found in an accused product, exactly. *Becton Dickinson & Co. v. C.R. Bard, Inc.*, 922 F.2d 792, 796 (Fed.Cir. 1990).

**B. Active Inducement of Infringement**

35 U.S.C. § 271(b) provides that: "Whoever actively induces infringement of a patent shall be liable as an infringer." *Hewlett-Packard Co. v. Bausch & Lomb*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). Unlike direct and contributory infringement, which require an offer or sale within the United States, extraterritorial activity that induces infringement is prohibited by § 271 (b). *Crystal Semiconductor Corp. v. Tritech Microelectronics Int'l, Inc.*, 246 F.3d 1336, 1351 (Fed. Cir. 2001). However, it is well settled that there can be no inducement of infringement without direct infringement by some party. *Epcon Gas Sys. Inc.*, 279 F.3d at 1033; *Met-Coil Sys. Corp. v. Korners Unlimited, Inc.*, 803 F.2d 684, 687 (Fed. Cir. 1986). Thus, upon a failure of proof of direct infringement, any claim of inducement of infringement also fails. *Epcon Gas Sys. Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1033 (Fed. Cir. 2002); *Moleculon Research Corp. v. CBS, Inc.*, 872 F.2d 407, 410 (Fed. Cir. 1989).

To establish liability for inducing infringement, the patentee must prove that the alleged infringer knowingly and with the requisite intent aided and abetted another's direct infringement. *Warner-Lambert Company v. Apotex Corp.*, 316 F.3d 1348, 1363-64 (Fed. Cir. 2003). Thus, passive conduct does

not satisfy the "actively induces" element. *Beverly Hills Fan Co. v. Royal Sovereign Corp.*, 21 F.3d 1558, 1569 (Fed. Cir. 1994) (noting that jurisdiction for a claim of inducement cannot be premised on an omission because active inducement requires commission of an affirmative act). Instead, active inducement is the commission of an affirmative act knowingly undertaken. *Tegal Corporation v. Tokyo Electron Company, Ltd.*, 248 F.3d 1376, 1378-79 (Fed.Cir. 2001). "[T]he term is as broad as the range of actions by which one in fact causes, or urges, or encourages, or aids another to infringe a patent." *Id.* at 1379 (quoting *Fromberg, Inc. v. Thornhill*, 315 F.2d 407, 411 (5th Cir. 1963). The plaintiff must therefore show that the alleged infringer intended its actions to induce infringing acts. Where the alleged infringer acts with knowledge of the patent, "intent additionally to cause an infringement can be presumed." *MEMC Electronic Materials, Inc. v. Mitsubishi Materials Silicon Corp., et al.*, 420 F.3d 1369, 1378 n.4 (Fed. Cir. 2005). Further, direct evidence of intent is not required. "The requisite intent to induce infringement may be inferred from all the circumstances." *Water Techs. Corp. v. Calco Ltd.*, 850 F.2d 660, 669 (Fed. Cir. 1988) (holding that preparing consumer instructions for infringing use and exerting control through trademark license was sufficient to infer intent); *Minn. Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1304-05 (Fed. Cir. 2002) (holding that supplying potentially infringing products along with instructions for infringing use was sufficient to infer intent); *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1365 (Fed. Cir. 2004) (holding that supplying product and publishing articles advocating infringing use was sufficient to infer intent).

As a matter of law, § 271(b) does not reach actions taken before issuance of the adverse patent. *National Presto Indus. v. West Bend Co.*, 76 F.3d 1185, 1196 (Fed. Cir. 1996) ("Although the tort of inducement is itself prospective, in that the direct infringement will not have occurred until after the acts of inducement, when no patent has issued at the time of the inducement there cannot be a violation of § 271(b).").

## III. Invalidity

Patents are presumed to be valid and the burden of establishing the invalidity of a patent rests on the party asserting invalidity. *See* 35 U.S.C. § 281. The factual findings supporting a conclusion of invalidity must be proven by clear and convincing evidence. *N. V. Akzo v. E.I. DuPont de Nemours*, 810 F.2d 1148, 1151 (Fed. Cir.1987). Thus, a party seeking to establish invalidity of a patent must overcome the presumption of validity with clear and convincing evidence. *Id.*

### A. Enablement

A patent grant is issued in exchange for an enabling disclosure of an invention. *White Consol. Indus., Inc. v. Vega Servo-Control, Inc.*, 713 F.2d 788, 791 (Fed. Cir. 1983). The enablement requirement of 35 U.S.C. § 112, paragraph 1, provides, in relevant part, that:

> The [patent] specification shall contain a written description of the invention, and the manner and process of making and using the [invention], in such full, clear, concise, and exact terms as to enable any person skilled in

> the art to which it pertains . . . to make and use the [invention].

35 U.S.C. § 112.

Enablement is determined at the time the patent application was filed. *Ajinomoto Co., Inc. v. Archer-Daniels-Midland* Co., 228 F.3d 1338, 1345 (Fed. Cir. 2000), *cert. denied*, 532 U.S. 1019 (2001). Determining whether a disclosure of a patent satisfies the enablement requirement is a question of law. *Atlas Powder Co. v. E.I. DuPont de Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984). The legal conclusion of enablement rests on factual underpinnings. *Union Pacific Resources Co. v. Chesapeake Energy Corp.*, 236 F.3d 684, 690 (Fed. Cir. 2001).

A decision on the issue of enablement "requires determination of whether a person skilled in the pertinent art, using the knowledge available to such a person and the disclosure in the patent document, could make and use the claimed invention without undue experimentation." *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941 (Fed. Cir. 1990). Factors to be considered in determining whether a disclosure would require undue experimentation include: (1) the quantity of experimentation necessary; (2) the amount of direction or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims. *In re Wands*, 858 F.2d 731 (Fed. Cir. 1988); *Enzo Biochem v. Calgene, Inc.*, 188 F.3d 1362, 1371 (Fed. Cir. 1999).

While some experimentation does not preclude enablement, the amount of experimentation must not be unduly extensive. *Atlas Powder Co.*, 750 F.2d at 1576. The test for undue experimentation allows for a considerable amount of experimentation if it is merely routine or if the patent specification provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed. *Johns Hopkins University v. CellPro, Inc.*, 152 F.3d 1342, 1360 (Fed. Cir. 1998).

**B. Anticipation**

In determining validity due to anticipation, the first step involves the proper interpretation of the claims. *Elmer v. ICC Fabricating, Inc.*, 67 F.3d 1571, 1574 (Fed. Cir. 1995). The second step involves determining whether the limitations of the claims as properly interpreted are met by the prior art. *Id.* "Invalidity for anticipation requires that all of the elements and limitations of the claim are found within a single prior art reference." *Scripps Clinic & Research Fdn. v. Genentech, Inc.*, 927 F 2d 1565, 1576 (Fed. Cir. 1991) ("There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention"); *Hazani v. U.S. Intern. Trade Com'n*, 126 F.3d 1473, 1477 (Fed.Cir.1997).

An anticipation analysis involves a three-part inquiry. First, the trier of fact must determine whether the challenging reference is prior art. *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576-78 (Fed. Cir. 1996); *Del-mar Eng'g, Lab v. United States*, 524 F.2d 1178, 1184 (Ct. Cl. 1975). Second, the fact finder must

ascertain that the prior art is enabling as to put the invention in the public's possession. *Akzo N. V. v. U.S. Int'l Trade Comm'n*, 808 F.2d 1471, 1479 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987). However, prior art patent references are presumed enabled. *In re Sasse*, 629 F.2d 675, 681 (C.C.P.A. 1980). In the third step, the trier of fact must ascertain whether the doctrine of identity applies, *i.e.*, whether each element of the accused claim is present either expressly or inherently in a single prior reference. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771 (Fed.Cir.1983), *cert. denied*, 465 U.S. 1026 (1984).

**C. Obviousness**

35 U.S.C. § 103 precludes the grant of a patent that is obvious to one of skill in the art. The statute provides that:

> if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

35 U.S.C. § 103. The ultimate determination of obviousness is a question of law based on underlying factual inquiries. *Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1479 (Fed. Cir. 1997); *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 989 (Fed. Cir. 1988). Those factual inquiries involve consideration of the four *Graham* factors: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the

pertinent art; and (4) any secondary considerations of nonobviousness, such as commercial success. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966); *B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582 (Fed. Cir.1996).

## ANALYSIS

### I. SUMCO's Objections to MEMC's Evidence

As a preliminary matter, before the Court can analyze SUMCO and MEMC's summary judgment motions, the Court must address SUMCO's Objections to Plaintiff's Evidence Submitted in Support of its Motion for Summary Judgment against Defendants' Invalidity Affirmative Defense and SUMCO's Objections to Plaintiff's Evidence Submitted in Opposition to Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity (collectively referred to herein as "SUMCO's Objections" or "Objections").[4]

In its Objections, SUMCO objects to the First, Second, Third, Fourth, Fifth, and Sixth Declarations of

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[4] Due to the fact that the same documentary evidence was submitted by MEMC in support of its own Motion for Summary Judgment against Defendants' Invalidity Affirmative Defense and in opposition to SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO's separately filed Objections assert the exact same legal arguments and address the exact same factual evidence. Accordingly, the two Objections have been considered, and are herein discussed, as if they were one filing.

Mule'Stagno.[5] The Court has already considered SUMCO's arguments against the Second and Sixth Declarations of Mule'Stagno, which were asserted in SUMCO's separately filed Second Motion to Exclude Expert. The Court has also ruled in SUMCO's favor.[6] Accordingly, the Court SUSTAINS SUMCO's objections to the First, Second, and Sixth Declarations of Mule'Stagno for the same reasons set forth in the separately filed Order granting SUMCO's Second Motion to Exclude Expert and the March 1, 2004 Order. These Declarations have not been considered by the Court as evidence supporting MEMC's infringement claim. As the Fourth Declaration of Mule'Stagno also pertains to MEMC's infringement claim, and contains a discussion of Mule'Stagno's testing procedures that is similarly vague and generalized, SUMCO's objections to it apply with equal force, and the Court therefore finds that SUMCO's objections are meritorious and are also SUSTAINED.

With regard to the Third and Fifth Declarations of Mule'Stagno, SUMCO objects to these Declarations as unqualified expert opinions, pursuant to Federal Rules of Evidence 403 and 702, and on the additional grounds that the Declarations are irrelevant, lack foundation, and include hearsay. However, SUMCO

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[5] Mule'Stagno has a PhD in Physics and has been employed by MEMC for over ten years. He is currently the Manager of MEMC's Metrology & Worldwide Labs, Global Quality Organization.

[6] The deficiencies of the First Declaration of Mule'Stagno were set forth in the Court's March 1, 2004 Order addressing SUMCO's First Motion to Exclude Expert.

does not further elaborate on the specific portions of the Declarations that purportedly lack foundation or consist of hearsay. Having reviewed these Declarations, the Court finds that it is quite obvious that the Third and Fifth Mule'Stagno Declarations pertain to SUMCO's invalidity defense and are therefore relevant. Further, since some of the testimony set forth in the Third and Fifth Declarations pertains to Mule'Stagno's observations as a percipient witness, Rule 702 is not applicable to all of the testimony contained in the Declarations. Having considered the Declarations, and SUMCO's objections, the Court concludes that it is not appropriate to exclude the Third and Firth Mule'Stagno Declarations in their entirety based on SUMCO's vague and unsupported evidentiary objections. To the extent that some of the testimony in the Third and Fifth Declarations describes Mule'Stagno's testing results, such testimony has not been considered by the Court for the same reasons set forth in the Court's separate Order pertaining to SUMCO's Second Motion to Exclude Expert. However, where MEMC has relied on portions of Mule'Stagno's testimony pertaining to other subjects, the admissibility or relevance of that testimony is discussed and addressed in the substantive portion of this Order, under the relevant legal standard. Thus, with regard to SUMCO's request that the Third and Fifth Declarations of Mule'Stagno be excluded, SUMCO's objection is OVERRULED except as otherwise noted in the substantive portion of the Order.

SUMCO also objects to: (1) the Expert Report of Robert Falster, (2) the Supplemental Report of Robert Falster, (3) paragraphs 3-13 of the First Declaration of

Robert Falster,(4) paragraphs 3-36 of the Second Declaration of Robert Falster, and (5) paragraphs 5-15 of the Declaration of Joseph Holzer. SUMCO objects to the aforementioned evidence on the grounds that it is inadmissible pursuant to Rules 403 and 702 of the Federal Rules of Evidence and because the evidence lacks foundation, includes hearsay, and is irrelevant.[7] Again, other than making blanket, and unsupported, assertions regarding the inadmissibility of the aforementioned testimony, SUMCO does not bother to explain to the Court which testimony is hearsay, which testimony is irrelevant, and which testimony lacks foundation. Instead, the essence of SUMCO's objection appears to be that Falster and Holzer's testimony and reports must be excluded because Falster and Holzer are the inventors of the '302 Patent and, thus, their testimony is "inherently unreliable." SUMCO also argues that Falster and Holzer's testimony regarding enablement, conception, and reduction to practice must be excluded because it is uncorroborated oral testimony by an interested party. While it is true that inventor testimony regarding conception or reduction to practice must be corroborated, this is not a basis for excluding the inventors' testimony in its entirety, since the same testimony may also bear on, or be relevant

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[7] SUMCO also contends that the Supplemental Report of Robert Falster should be excluded as untimely. However, since SUMCO concedes that it received the report on January 31, 2004, it is clear that SUMCO has not been unduly prejudiced by the initial delay. Further, since the parties have asked that the Court resolve this case through summary judgment, the interests of justice warrant full consideration of all of the admissible evidence presented to the Court. The Court therefore declines to exclude the Supplemental Report of Robert Falster on this basis.

to, other dispositive issues in the instant summary judgment motions. Further, the weight to be given to Falster and Holzer's testimony is most properly addressed under the relevant legal standard and in the substantive portion of this Order. Additionally, SUMCO has not provided the Court with any basis to conclude that Falster and Holzer are anything other than qualified experts in the semiconductor industry. Accordingly, SUMCO's objections to the Falster and Holzer testimony are OVERRULED except as otherwise noted in the substantive portion of this Order.

Finally, the Court notes that SUMCO objects to Exhibit 11 of the Mathiowetz Declaration, submitted by MEMC in support of its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense. As MEMC points out, however, Exhibit 11 is not evidence, it is merely a summary of MEMC's arguments that MEMC prepared in order to crystallize MEMC's arguments for the Court. Accordingly, SUMCO's evidentiary objections are inappropriate and are therefore OVERRULED. Having resolved the evidentiary objections, the Court now turns to the substance of the summary judgment motions.

## II. Infringement

### A. Literal Infringement

As a threshold matter, the first issue that this Court must determine with respect to three of the four

summary judgment motions pending before the Court[8] is whether the accused wafers literally infringe the '302 Patent. The "accused wafers" in this litigation are the wafers allegedly supplied by SUMCO to SAS under Samsung Specification PWP10725S2. MEMC's Motion for Summary Judgment Against Defendants for Active Inducement of Infringement is premised on the argument that the accused wafers literally infringe the '302 Patent. In its own Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO argues that it is entitled to a summary judgment finding that the '302 Patent is *not* infringed by the accused wafers. SUMCO asserts the following alternative bases for a finding of non-infringement: (1) the accused wafers do not include an "axially symmetric region;" (2) MEMC has failed in its burden of proving that there are less than about 1,000 defects/cm3 in the accused wafers and thus MEMC has not proven that the accused wafers are substantially free of agglomerated vacancy intrinsic point defects; (3) the areas in the accused wafers that MEMC claims are agglomerated vacancy intrinsic point defects are actually "low-temperature centers of oxygen precipitation" areas; and (4) the "vacancies" in the accused wafers cannot be the "predominant intrinsic point defect" since, at room temperature, there are no vacancy or interstitial intrinsic point defects.

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[8] The three motions that are implicated by the Court's assessment of MEMC's infringement claim are: (1) SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity; (2) MEMC's Motion for Summary Judgment Against Defendants for Active Inducement of Infringement; and (3) SUMCO's Motion for Summary Judgment of Zero Damages.

MEMC, on the other hand, argues that it can prove literal infringement on each of the bases asserted by SUMCO based on either (1) the testing conducted by MEMC's expert, Mule'Stagno; (2) admissions made by SUMCO's experts; (3) SUMCO's own testing results; or (4) two papers published by Park and two SUMCO employees, Furuya and Harada.

MEMC has the burden of proving patent infringement. *See Carroll Touch, Inc. v. Electro Mech. Sys., Inc.*, 15 F.3d 1573, 1578 (Fed. Cir. 1993). To prove infringement, MEMC must show that *all* elements of the asserted claims are present in the accused wafers, literally. If the undisputed facts show that even one element is missing from the accused wafers, SUMCO is entitled to a summary judgment finding of non-infringement. *Lemelson v. U.S.*, 752 F.2d 1538, 1551 (Fed. Cir. 1985).

**1. Axial Symmetry**

In response to SUMCO's first argument of non-infringement, MEMC contends that the facts establish that the accused wafers are "substantially" axially symmetric, and that this is all that is required by the '302 Patent. In support of its argument, MEMC relies on the following evidence: (1) Mule'Stagno's test results, and (2) assumptions made by certain third parties regarding the prior art. MEMC further argues that SUMCO's witnesses have admitted that all silicon grown by the Czochralski method is substantially axially symmetric.

In response to SUMCO's separately filed Second Motion to Exclude Expert, the Court has already

evaluated the evidence and testimony submitted by Mule'Stagno and has determined that it should be excluded as unverified and unreliable. Accordingly, MEMC may not rely on Mule'Stagno's test results to establish that the accused wafers are axially symmetric.[9]

Further, contrary to MEMC's assertions, SUMCO is not arguing that the '302 Patent requires "perfect" symmetry. However, as SUMCO points out, the term "axially symmetric region" was emphasized in arguments made to the United States Patent Office to *define over* the prior art. *See* Powers Decl. ISO Mot. of Non-Infring. at Ex. 8 (King Decl. at ¶¶ 4-6). Thus, a finding of infringement requires a showing that regions in the accused wafers are at least approximately "axially symmetric" as shown in Figure 5 or as described in Column 8 of the '302 Patent. MEMC has not come forth with any evidence sufficient

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[9] Indeed, if the Court were to consider Mule'Stagno's Second Declaration, and the test results reported therein, the Court would also have to consider SUMCO's argument that some of the testing performed by Mule'Stagno indicates that the accused wafers are *not* axially symmetric. As SUMCO points out, the Lifetime images are the only tests performed by Mule'Stagno that indicate the shape of the vacancy and interstitial dominated regions across the whole wafer. SUMCO argues that these Lifetime maps show very irregular, non-symmetrical regions. Although Mule'Stagno claims that the irregular color patterns are due to "noise," he does not provide any objective verification for this assertion. Further, as SUMCO notes, Mule'Stagno's BMD testing at 90° and 180° show very irregular radial density patterns.

to prove that the accused wafers contain such axially symmetric regions.

In fact, MEMC's argument depends solely on evidence that does not prove what MEMC contends that it proves. For example, MEMC cites to a written analysis of the '302 Patent by SUMCO's expert Eidenzon in which Eidenzon states that "[s]ome crystal regions can be substantially free from agglomerated v and I [and] these regions always are axially symmetric due to cylindrical symmetry of the ingots." Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Ex. 4 (emphasis in original omitted). However, as SUMCO has pointed out, another SUMCO expert, Wildes, has clarified that Eidenzon's statement refers to the prior art and was made prior to the Court's *Markman* ruling. *Id.* at Ex. 8 (Wildes Depo. at 75:6-76:21). The other statements made by Eidenzon that are identified in MEMC's briefs are also references to the prior art and thus do not conclusively establish that the *accused wafers* are axially symmetric within the meaning of the '302 Patent. *See id.* at Ex. 5 (Eidenzon Depo. at 14: 16-23, 39:7-13). Accordingly, on this basis, SUMCO is entitled to summary judgment in its favor on the issue of literal non-infringement.

### 2. Substantially Free of Agglomerated Vacancy Intrinsic Point Defects

SUMCO has also persuasively established that MEMC has not shown that the accused wafers meet the claim limitation requiring that the wafers have a region in which "vacancies are the predominant intrinsic point defect" and that is "substantially free of agglomerated vacancy intrinsic point defects." As

noted previously, pursuant to the Court's claim construction, to prove that the region is "substantially free of agglomerated vacancy intrinsic point defects," MEMC must show that the accused wafers have a region in which the concentration of agglomerated vacancy intrinsic point defects is less than about 1,000 defects/cm3.

MEMC's sole evidence that this claim limitation has been met is: (1) the Flow Pattern Defect ("FPD") testing set forth in Mule'Stagno's Expert Report;(2) certain statements made by Park and two SUMCO employees; and (3) SUMCO's test data and witness admissions. Again, however, this Court has already determined that Mule'Stagno's Expert Report must be excluded because MEMC has not sufficiently established that Mule'Stagno's testing methods are reliable. The bare and unsupported assertions set forth in Mule'Stagno's Expert Report, as well as his Sixth Declaration, with regard to FPD testing only serve to further underscore this Court's conclusion that the testimony must be excluded.

For example, it appears from Mule'Stagno's Second Declaration that he only scanned one quarter of each wafer in order to determine whether the accused wafer contains agglomerated defects. *See* Powers Decl. ISO Second Mot. to Exclude Expert at Ex. 3. However, there are no objective sources identified in Mule'Stagno's Second Declaration showing that such a methodology is appropriate or reliable. *Id.* Further, Mule'Stagno admits that he detected certain flow pattern activity in the accused wafers but concludes, without any support or explanation, that such activity is due to "contamination" or "damage" rather than the

presence of agglomerated vacancy defects. *Id.* Further, and most importantly, Mule'Stagno admits in his Sixth Declaration that the detection limit for a single view through a 50 power microscope, which is the method used by Mule'Stagno to perform the test, is 3,300 defects per cubic centimeter. *See* Mathiowetz Decl. ISO Opp. to Second Mot. to Exclude Expert at Ex. 14. While Mule'Stagno contends that he nevertheless performed the test in such a way as to "reduce" the detection limit to the limit required by the '302 Patent, his sole support and explanation for this altered methodology is as follows:

> The problem with SUMCO's argument is that I personally performed many more views that just one isolated view through a microscope. For three side-by-side views through the microscope, three times as much silicon is etched which reduces the detection limit by one third, *i.e.* reduces the detection limit to 1100 defects per centimeter cubed. 1100 defects per centimeter cubed is the detection limit recited in the '302 patent ("about 1000 per centimeter cubed"). But here, I performed many more than even three views through the microscope which would lower the detection limit even further and would certainly meet the detection limit recited in the '302 patent.

*Id.* Thus, MEMC expects the Court to conclude that it has proven literal infringement based on Mule'Stagno's completely unsupported and unscientific explanation that he performed "many more views than just one isolated view" and that performing "many" views is the appropriate method of meeting a detection

limit of about 1,000 defects per cubic centimeter.[10] This is exactly the type of imprecise and unscientific testimony that is inadmissible under *Daubert*. *See Novartis Corp. v. Ben Venue Laboratories, Inc.*, 271 F.3d 1043, 1051 (Fed. Cir. 2001) ("[T]he expert must set forth the factual foundation for his opinion in sufficient detail for the court to determine whether that factual foundation would support a finding of infringement under the claim construction adopted by the court") (internal quotations omitted).

MEMC's arguments regarding the articles published by Park, Furuya, and Harada are similarly conclusory and, thus, similarly flawed. For example, citing the two articles authored by Park, Furuya, and Harada, MEMC contends that the authors "expressly found that pure silicon' wafers made by the Czochralski ("CZ") method, *i.e.* the accused wafers in this litigation, are free of agglomerated defects." *See* MEMC Opp. to Mot. re Non-Infring. at 7. However, in order for this statement to prove infringement, MEMC would have to show that the authors are, in fact, specifically discussing the accused wafers. However, instead of proving this, MEMC merely asks the Court to assume it. Moreover, although MEMC also concludes that the authors' "scientific methodology for reaching this conclusion was the same as that used by

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[10] Further, since MEMC has produced no objective verification that "1,100 defects per centimeter cubed" is equivalent to the limitation of "about 1,000 defects per centimeter cubed," it appears that MEMC expects the Court to overlook the fact that even Mule'Stagno admits that he did not meet the test limit required to prove infringement of the '302 Patent.

Dr. Mule'Stagno in his expert report," they do not provide the Court with any evidence that this statement is true, other than Mule'Stagno's own vague and unsupported assertions. Further, MEMC does not cite to any evidence or testimony sufficient to show that Park, Furuya, and Harada are discussing wafers that have a region in which the concentration of agglomerated vacancy intrinsic point defects is less than about 1,000 defects/cm3. In fact, there is no discussion of this specific detection limit in the articles MEMC has identified. *See* Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Exs. 11, 12.

Next, MEMC argues that SUMCO's own evidence establishes that the accused wafers literally infringe. Specifically, MEMC states that SUMCO has produced a spreadsheet that *proves* that the accused wafers are "substantially free of agglomerated vacancy intrinsic point defects." *See* Mathiowetz Decl. ISO Mot. re Active Induc. at Ex. 10. However, as SUMCO points out, MEMC has produced no evidence – such as deposition testimony from the author of the spreadsheet – that sheds any light on what is actually reflected in the spreadsheet. Instead, MEMC offers the Court its own speculation and conjecture as to what is reflected in the report. This is completely insufficient to support a finding of literal infringement. For example, while it is true that the spreadsheet contains "0's" (zero's) in the columns entitled "D defects" and "OISF," there is nothing in the spreadsheet that shows: (1) the type of test that was performed, or (2) that the test was scientific or reliable, or (3) that the wafers were tested at the detection limit required by the '302 Patent. Accordingly, this evidence is insufficient to support MEMC's Motion for Summary

Judgment of Active Inducement and does not create a genuine issue of fact sufficient to preclude the granting of summary judgment to SUMCO on its own Motion for Summary Judgment of Non-Infringement and Invalidity.

Similarly, the SUMCO witness "admissions" that MEMC contends prove literal infringement are so vague that they provide no assistance to the Court in determining the issue of literal infringement. For example, in its Reply brief, MEMC alleges, for the first time, that Wildes' deposition testimony proves that the accused wafers are "substantially free of agglomerated vacancy intrinsic point defects." However, the sum total of Wildes' testimony is as follows:

> Q: But it is fair to say, isn't it, that you are aware that many of the accused wafers that [are] vacancy dominant have no OISF ring?
>
> A: Yes.

*See* Mathiowetz Decl. ISO Opp. to Mot. to Exclude Expert at Ex. 11 (Wildes Depo. at 92:23-93:1). All that this testimony proves – if it proves anything at all – is that some of the accused wafers lack one type of vacancy defect, the OISF ring. This is a far cry from proving that the accused wafers Wildes is referring to have "a single crystal silicon wafer having a central axis, a front side and a back side which are generally perpendicular to the central axis, a circumferential edge, and a radius extending from the central axis to the circumferential edge of the wafer, the wafer comprising a first axially symmetric region in which vacancies are the predominant intrinsic point defect

and which is substantially free of agglomerated vacancy intrinsic point defects wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm," which is what is claimed in claim 1 of the '302 Patent.

MEMC reliance on Furuya's deposition testimony is similarly misplaced. *See* Mathiowetz Decl. ISO Mot. re Active Induc. at Ex. 2 (Furuya Depo. at 371:16-375:11). For example, it is clear from Furuya's deposition testimony that his "conclusions" regarding the accused wafers are based, at least in part, on speculation:

> Q: When we have that construction, does the vacancy rich material on the inside or the outside of the wafer have any COP defects?
>
> A: In pure silicon there is no COP.
>
> Q: Do you know what percentage of the pure silicon wafers sold by SUMCO in the last few years have been made up of vacancy rich material from the center to the edge?
>
> A: Based on the information that I was able to obtain when I worked in Engineering Technology, I can say something, but is that – is that okay?
>
> Q: Sure.
>
> A: I'm not sure about the accurate number, but in very simple terms one possibility is that they

were one-third each, those three types that we discussed, we talked about.

Q: So one-third of the pure silicon wafers were vacancy rich from center to edge, and one-third were interstitial rich from center to edge, and one-third had vacancy rich material at the center that was surrounded by either I [interstitial] rich material or else I [interstitial] rich material and vacancy rich material?

A: Yeah, simply put, but there's a chance that the I [interstitial] rich silicon had a little bigger share. That's just as a possibility. It all depends on – the same thing can be said of all three types, actually, as a possibility.

Q: That all three types may be a little more or a little less than a third?

A: Yes, just – it's my speculation.

*Id.* at Ex. 2 (Furuya Depo. at 374:7-375:11). Further, with regard to the portions of Furuya's testimony that may not be based on speculation, MEMC does not provide the Court with any additional testimony from Furuya indicating that the wafers were tested at the detection limit required by the '302 Patent. Additionally, Furuya's single statement regarding the lack of COP defects in pure silicon does not come close to establishing that the accused wafers were substantially free of all agglomerated vacancy intrinsic point defects or that the wafers had a single crystal silicon wafer having a central axis, a front side and a back side which are generally perpendicular to the

central axis, a circumferential edge, and a radius extending from the central axis to the circumferential edge of the wafer, the wafer comprising a first axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm. Again, in order to prove literal infringement, MEMC must show that each limitation of this claim is met by the accused wafers, literally. SUMCO's witness testimony is therefore also insufficient to support MEMC's Motion for Summary Judgment of Active Inducement and does not create a genuine issue of fact sufficient to preclude the granting of summary judgment to SUMCO on its own Motion for Summary Judgment of Non-Infringement and Invalidity.

In sum, MEMC has not cited any admissible evidence that establishes that any one of the accused wafers is "substantially free" of all agglomerated vacancy defects under the definition set forth in the '302 Patent, *i.e.*, less than about 1,000 defects/cm3. Accordingly, SUMCO is entitled to summary judgment in its favor on the issue of literal non-infringement on this basis as well.

### 3. Vacancy Intrinsic Point Defects

SUMCO also argues that the '302 Patent is not met by the accused wafers because the areas in the accused wafers that MEMC claims are agglomerated vacancy intrinsic point defects are actually "low-temperature centers of oxygen precipitation" (or "LTC") areas and,

since LTC areas are found in the prior art publications of Eidenzon and Puzanov, as a matter of law, the accused wafers cannot infringe the '302 Patent. The Court has disregarded this argument as unpersuasive. As MEMC points out, a "practicing the prior art" argument is not a valid defense to literal infringement. *Ecolab, Inc. v. Paraclipse, Inc.*, 285 F.3d 1362, 1377 (Fed. Cir. 2002). This is due to the fact that the issues of infringement and invalidity are separate issues, each with its own burden of proof.

### 4. Vacancies as the Predominant Intrinsic Point Defect

With respect to its fourth argument, SUMCO argues that the "vacancies" in the accused wafers cannot be the "predominant intrinsic point defect" since, at room temperature, there are no vacancy or interstitial intrinsic point defects. Again, as MEMC points out, this argument makes little sense and is contrary to both the Court's construction of the '302 Patent and the basic understanding of those skilled in the art. Indeed, it is commonly accepted that silicon may contain both interstitial defects and vacancy defects. Further, the fact that oxygen clusters with vacancies as the crystal cools to room temperature in the vacancy dominated agglomerated defect-free material does not change the fact that there may be more vacancies than self-interstitials in the material at room temperature. Accordingly, the Court has not relied on this argument in concluding that the '302 Patent is not infringed.

### 5. MEMC's Repudiation of its Infringement Contentions

As a final matter, the Court notes that SUMCO also argues that it is entitled to a finding of non-infringement because MEMC has repudiated the sole basis for literal infringement alleged in its Final Infringement Contentions. This argument is premised on the fact that the principal named inventor of the '302 Patent, Falster, has stated that: "The Samsung Specification No. PWP10725S2 does not inherently teach any wafer covered by any of the asserted claims." See Powers Decl. ISO Opp. to Mot. re Active Induc. at Ex. 6. It is also based on the fact that MEMC stated in its reply brief to the Court of Appeals for the Federal Circuit that: "Since the '302 patent requires silicon regions substantially free of such agglomerated defects, wafers that meet the PWP10725S2 specification do not necessarily infringe the '302 patent." *See id.* at Ex. 7.

MEMC contends that these admissions are irrelevant because MEMC is merely arguing that most, but not all, of SUMCO's wafers made according to Specification PWP10725S2 infringe the asserted claims. It is true that ordinarily a plaintiff need not prove that every single product made by the defendant infringes its patent. *See Bell Comm. Research, Inc. v. Vitalink Comm. Corp.*, 55 F.3d 615, 622-23 (Fed. Cir. 1995) ("[A]n accused product that sometimes, but not always, embodies a claimed method nonetheless infringes."). In this case, however, MEMC has specifically alleged in its Preliminary Infringement Contentions, which became its Final Infringement Contentions, that wafers meeting Specification

PWP10725S2 *do* necessarily infringe. *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 5 (MEMC Preliminary Infringement Contentions). MEMC does not provide any explanation to the Court as to how this discrepancy can be reconciled. Thus, MEMC's admissions are very damaging to its case. Indeed, such admissions strengthen the Court's finding that MEMC has not met its burden of proof with respect to the issue of literal infringement. Accordingly, the Court hereby GRANTS SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity and DENIES MEMC's Motion for Summary Judgment Against Defendants for Active Inducement. The Court therefore also DENIES SUMCO's Motion for Summary Judgment of Zero Damages as MOOT.

## III. Invalidity

In its Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO seeks summary judgment in its favor on the following affirmative defenses: (1) the '302 Patent is invalid under 35 U.S.C. § 112 for lack of enablement; (2) the asserted claims of the '302 Patent are invalid under 35 U.S.C. § 102(a) or (b) as anticipated by certain prior art publications; and (3) the asserted claims of the '302 Patent are invalid under 35 U.S.C. § 102(e), (f), or (g) as anticipated by the '610 Patent.

In its own cross-Motion for Summary Judgment, Plaintiff seeks summary judgment that the '302 Patent is valid and satisfies the requirements of 35 U.S.C. §§ 102, 103, and 112.

## A. Enablement

In support of its Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO alleges that the '302 Patent is invalid for lack of enablement because: (1) it does not disclose any method or apparatus for obtaining a "first axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm" and (2) it does not describe any method or approach for forming a "second axially symmetric region in which silicon self-interstitial atoms are the predominant intrinsic point defect and which is substantially free of agglomerated silicon self-interstitial intrinsic point defects."

MEMC opposes SUMCO's Motion and, in turn, argues in its own Motion for Summary Judgment against Defendants' Invalidity Affirmative Defense that the '302 Patent satisfies the enablement requirement of 35 U.S.C. § 112. Since SUMCO is asserting lack of enablement as an affirmative defense, SUMCO bears the burden of establishing invalidity by clear and convincing evidence. *N. V. Akzo*, 810 F.2d at 1151.

### 1. Background Pertaining to the '302 Patent

According to MEMC, the '302 Patent teaches one skilled in the art how to extend the time that a silicon crystal cools from its solidification temperature down

to about 1050°C so that point defect concentrations fall below the level at which agglomeration occurs. The initial type and concentration of point defects at the melt interface in growing silicon is determined by the ratio v/G, where "v" is the pull rate or velocity at which the crystal is being pulled from the melt and "G" is the temperature gradient in the direction of the growth of the crystals near the interface between the molten and solid silicon. By extending the relevant time period, the concentrations of point defects are reduced. MEMC asserts that the '302 Patent describes this process of extended cooling and that column 6, lines 6-18 of the '302 Patent teach that the critical v/GO value is 2.1x10-5 cm2/sK. *See* 302:6:6-18.

According to MEMC, the '302 Patent further teaches one skilled in the art that if the critical value of v/G0 is reached at some point along the radius of the silicon wafer, there will be a V/I boundary where the silicon changes from vacancy dominated to interstitial dominated. *See* 302:7:59-8:1. The '302 Patent also teaches that agglomeration reactions can occur as a silicon crystal cools. According to MEMC, column 7, lines 1 through 25 of the '302 Patent teach that the concentration of vacancies and interstitials becomes increasingly supersaturated as the crystal cools and, if a critical supersaturation concentration is reached, the agglomeration reaction occurs. *See* 302:7:1-25.

Also according to MEMC, the '302 Patent discloses controlled cooling in order to "balance" any out-of-balance initial concentrations, thereby creating wide, practical and stable "windows" for perfect crystal growth. For example, MEMC contends that at column 7, lines 44 through column 8, line 23 of the '302

Patent, it is disclosed that the rate at which the silicon crystal cools from the solidification temperature down to the temperature at which agglomeration reactions can occur may be extended to allow redistribution and suppression of vacancies and silicon self-interstitials to prevent agglomerated vacancy and agglomerated self-interstitial defects from forming. *See* 302:7:44-8:23. MEMC further contends that the '302 Patent teaches that the initial concentrations may be suppressed by controlling the period of time the crystal is maintained above 1050°C to allow greater time for out-diffusion of intrinsic point defects to the surface and for diffusion and recombination of interstitials and vacancies ("self-annihilation") at the V/I boundary inside the silicon crystal. *See* 302:7:44-58.

MEMC also alleges that the '302 Patent describes how to extend the cooling time from the solidification temperature down to about 1050°C to form silicon wafers having large vacancy dominated agglomerated vacancy defect free regions and interstitial dominated agglomerated interstitial defect free regions. For example, MEMC asserts that, at column 9, lines 33-49 of the '302 Patent, it is described how the crystal is cooled from the solidification temperature down to about 1050°C over a period of time ranging from 5 to 75 hours. *See* 302:9:33-49. MEMC also asserts that the '302 patent teaches that by slow cooling a crystal having a V/I boundary, a diffusion and recombination of point defects at the V/I boundary can sufficiently suppress the initial concentrations of the point defects such that the agglomeration reaction does not occur. *See* 302:8:9-23. Additionally, MEMC asserts that the '302 Patent teaches that interstitials diffuse faster than vacancies, and, as such, the diffusion and

recombination at the V/I boundary causes movement of the V/I boundary during cooling. *See* 302:8:9-23. MEMC further contends that at column 9, line 60 through column 10, line 3 of the '302 Patent, the design criteria for v/G0 tolerance and cooling history is disclosed. MEMC also contends that this design criteria is described at column 20, lines 40 through 52.

Additionally, MEMC asserts that Figures 16b and 23 of the '302 Patent show images of axial slices taken from two single crystal ingots grown under the controlled cooling conditions described in the '302 Patent.

### 2. SUMCO's Arguments in Support of a Finding of Lack of Enablement

SUMCO does not dispute that the '302 Patent contains descriptions and disclosures regarding temperature gradient, pull rate, and cooling time, but argues that these principles were well known prior to the issuance of the '302 Patent and that the '302 Patent specification only generally describes the requisite combinations of temperature gradient, pull rate, and cooling time. SUMCO further argues that merely providing a description of the necessary ratio and requirement for slow cooling does not convey to one of ordinary skill in the art *how* to accomplish or maintain the desired ratio during cooling. To provide the Court with clear and convincing evidence supporting these allegations, SUMCO has submitted

the declarations of three experts, Eidenzon,[11] Wildes,[12] and Park.[13] MEMC has not objected to the admissibility of these declarations and does not dispute that Eidenzon, Wildes, and Park are experts of ordinary skill in the silicon industry.

Eidenzon states that she has reviewed the '302 Patent and has concluded that the '302 Patent does not disclose how to make the silicon wafer that is described in the asserted claims of the '302 Patent. Powers Decl. ISO Mot. re Non-Infring. at Ex. 5

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[11] Eidenzon has a PhD in material science and engineering from the Moscow Institute of Steel and Alloys. *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 5 (Eidenzon Decl. at ¶ 1). For more than thirty years, she worked at the Podolsk Chemical and Metallurgical Plant, where she took part in research of silicon crystal growth, defect properties, and developing technology for silicon crystals with desired properties. *Id.* Except for the fact that she has been retained as an expert in this litigation, Eidenzon is not otherwise affiliated with SUMCO.

[12] Wildes has a PhD in Physical Organic Chemistry from the University of North Carolina. *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 4 (Wildes Decl. at ¶ 1). Since 1986, his professional and research interests have focused on various aspects of silicon wafers including crystal growing. *Id.* Wildes is currently an employee of SUMCO USA. *Id.*

[13] Park obtained his Doctorate Degree in Materials Science and Engineering from North Carolina State University in 1994 and is currently a Professor at the Hanyang University in Seoul, Korea. *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 1 (Park Decl. at ¶ 1, 2). He is also the director of the Advanced Semiconductor Material & Device Development Center at Hanyang University. *Id.* Additionally, Park is the inventor of U.S. Patent No. 6,045,610.

(Eidenzon Decl. at ¶¶ 2-4). Eidenzon also points out that the examples used in the '302 Patent specification are ambiguous. For example, most of the defect patterns demonstrated in the patent specification *(e.g.*, Figures 6, 8, 14, 20, 21, 22, and 23) suggest that the agglomerated intrinsic point defects are present in both the vacancy – and interstitial-dominant regions. *Id.* at Ex. 5 (Eidenzon Decl. at ¶ 5). However, the only example with a vacancy-rich agglomerate free area is shown in Figures 16a and b. *Id.* With respect to these figures, the '302 Patent does not provide any direct evidence that the surrounding area is free of interstitial agglomerated point defects. *Id.* Further, according to Eidenzon, the '302 Patent specification does not adequately describe how the vacancy dominant or interstitial dominant symmetric regions are made, especially with respect to the width or length limitations. Overall, due to this lack of specificity, Eidenzon concludes that "the '302 Patent is useless to anyone working in this field." *Id.* at Ex. 5 (Eidenzon Decl. at ¶ 9). She further states that "[e]ven with all my expertise, I cannot find the details in the '302 patent that would be required to create defect-free silicon growth as claimed." *Id.* at Ex. 5 (Eidenzon Decl. at ¶ 10).

Wildes agrees that the '302 Patent does not teach silicon wafers that are entirely vacancy dominant and substantially agglomerate free across the surface of the wafer. *Id.* at Ex. 4 (Wildes Decl. at ¶ 10). In particular, Wildes takes issue with MEMC's assertion that Figure 23 and column 22, lines 60 to 64 disclose such wafers. *Id.* According to Wildes, the crystal described in those sections of the '302 Patent was grown using the method disclosed by Voronkov in

1982. *Id.* Wildes asserts that the Voronkov method is precisely what is described in column 7, lines 32-43 of the '302 Patent and summarily dismissed as too "difficult to achieve." *Id.* Wildes further asserts that the only other references in the '302 Patent that describe regions that are equal to the radius of the ingot and are substantially free of agglomerated defects are references to material that is partially or entirely interstitial. *Id.* Thus, Wildes concludes that the '302 Patent does not disclose a region of vacancy dominant, substantially agglomerate free material that extends across the entire surface of the wafer. *Id.*

Park has also stated that he has reviewed the '302 Patent and has concluded that it is flawed because it does not even refer to or acknowledge the 1982 publication of Voronkov, which teaches that a region can be formed in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated defects. Powers Decl. ISO Mot. re Non-Infring. at Ex. 1 (Park Decl. at ¶¶ 15-16). According to Park, the Voronkov publication also teaches that a region can be formed in which silicon self-interstitial atoms are the predominant intrinsic point defect and which is substantially free of agglomerated silicon self-interstitial intrinsic point defects. *Id.*

Additionally, and most importantly, both Eidenzon and Wildes opine that the '302 Patent is invalid for lack of enablement because its description of the hot zone design is "too generic" and thus the patent does not adequately disclose the required hot zone. *See* Powers Decl. ISO Mot. re Non-Infring. at Exs. 4 (Wildes Decl. at ¶¶ 5-6) and Ex. 5 (Eidenzon Decl. at ¶¶ 6-10). According to Wildes, the "hot zone design is

critical to the manufacturing of silicon wafers[.]" *Id.* at Ex. 4 (Wildes Decl. at ¶ 4). In fact, Wildes contends that the hot zone design is such a significant part of the manufacturing process that "MSIL spent many millions of dollars in designing a hot zone, including the modeling and simulation methodology, in order to satisfy the requirements of Samsung Specification PWP10725S2." *Id.* Further, Eidenzon has stated that "[i]t is very difficult to produce defect-free silicon even with a well-designed hot zone and with substantial modeling and simulation expertise." *Id.* at Ex. 5 (Eidenzon Decl. at ¶ 10). Accordingly, SUMCO's experts conclude that the absence of any disclosure regarding the necessary hot zone design renders the '302 Patent invalid because it means that a person skilled in the pertinent art could not make or use the claimed invention without the need for undue experimentation.

In response, MEMC argues that, due to the teachings of the '302 Patent, it would be well within the knowledge and ability of one skilled in the art in 1998 to modify a then-existing crystal puller with the commonly found insulators, heaters, radiation shields and magnetic fields of that time period to extend and control the time during which a pulled silicon ingot cooled from the solidification temperature down to 1050°C. MEMC further argues that enablement is "proven" by the very "fact" that the inventors of the 302 Patent reduced the patent to practice in 1997 by making "just such modifications."

As an initial matter, the Court notes that MEMC's argument is based solely on the declarations submitted by Mule'Stagno, an employee of MEMC, and the

named inventors of the '302 Patent, Falster and Holzer. In order to establish an actual reduction to practice, an inventor's testimony must be corroborated by independent evidence. *See Cooper v. Goldfarb*, 154 F.3d 1321, 1330 (Fed. Cir. 1998). Here, MEMC has not produced any such corroborating evidence. Even if the Court were to consider Mule'Stagno's Third Declaration to be such corroborating testimony, which it is not under the applicable standard because he is an interested party, the foundation that has been provided as the basis for Mule'Stagno's testimony is questionable. For example, Mule'Stagno merely states that he has "personal knowledge that the inventors of the '302 Patent produced silicon wafers having a large region of vacancy dominated agglomerated vacancy defect-free silicon surrounded by a region of interstitial dominated agglomerated interstitial defect-free silicon prior to September 5th, 1997." *See* Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Ex. 16 (Third Mule'Stagno Decl. at ¶ 2). However, Mule'Stagno does not provide any further explanation with regard to the basis of his personal knowledge, such as whether he directly participated in the manufacturing process or whether his knowledge of the process employed by the inventors is merely based on their communications to him after the fact.

Further, even assuming, *arguendo*, that the Declarations of Falster and Holzer, and the Third Declaration of Mule'Stagno, are admissible evidence that MEMC reduced the '302 Patent to practice in 1997, the Declarations do not create a genuine issue of fact precluding summary judgment in SUMCO's favor. The critical issue here is whether the '302 is sufficiently enabling *without the need for undue*

*experimentation.* In determining whether a disclosure would require undue experimentation, the Court may consider, *inter alia*, the (1) the quantity of experimentation necessary; (2) the amount of direction or guidance present; (3) the predictability or unpredictability of the art; and (4) the breadth of the claims. *In re Wands*, 858 F.2d at 731. Here, the breadth of the claims is quite expansive, and Falster and Holzer's testimony does not show that they did not engage in undue experimentation to reduce the patent to practice. Instead, their testimony supports SUMCO's assertion that the necessary direction and guidance is, in fact, missing from the '302 Patent. For example, absent from Holzer's Declaration is any reference to where, in the '302 Patent, the necessary hot zone design is disclosed. *See* Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Ex. 14. Further, Holzer admits that, in order to produce vacancy and interstitial dominated agglomerate free silicon, he and the other named inventors had to perform certain unspecified modifications to "ordinary hot zones." *Id.* at Ex. 14 (Holzer Decl. at ¶ 15).

Falster's Declaration also compels the conclusion that the guidance set forth in the '302 Patent is sorely lacking. For instance, in Falster's Declaration he states:

> The equipment used to extend the cooling time of silicon crystals was well known in the art prior to the '302 patent and is described in the patent. For example, the '302 patent states:
>
> > Control of the cooling rate can be achieved by using ***any means*** currently

> known in the art for minimizing heat transfer, including the use of insulators, heaters, radiation shields, and magnetic fields. Column 9, lines 46-49.

*Id.* at Ex. 15 (Falster Decl. at ¶ 10) (emphasis added). Falster does not identify any other provision in the '302 Patent that describes or discloses the means used to achieve the required control of the cooling rate.

Indeed, the only description of the actual hot zone purportedly used by the inventors is set forth in the Third Declaration of Mule'Stagno. However, in his Declaration, Mule'Stagno merely states that the inventors used a SAC-1 hot zone and then "modified" it by inserting a heat shield to slow the rate at which the ingot cooled. *Id.* at Ex. 16 (Third Mule'Stagno Decl. at ¶ 3). Mule'Stagno also vaguely asserts that the heat shield was made from a conventional crucible "by cutting a hole through the bottom of it." *Id.* No other explanation regarding the hot zone design is provided. As such, the Third Declaration of Mule'Stagno makes clear that the hot zone design purportedly used by the inventors is not disclosed in the '302 Patent.

Since it is undisputed that the necessary hot zone design is not disclosed in the '302 Patent and it is also undisputed that a specific hot zone design coupled with modeling and simulation work is essential to producing defect-free zones in silicon wafers, the Court concludes that SUMCO has proven, by clear and convincing evidence, that the '302 Patent is invalid for lack of enablement. Accordingly, the Court hereby GRANTS SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity on this basis.

MEMC's Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense is therefore DENIED IN PART.

### B. Anticipation

Since the Court concludes that the '302 Patent is not infringed by the accused wafers and is invalid for lack of enablement, the Court need not reach SUMCO's alternative argument that the '302 Patent is also invalid as anticipated by certain prior art. Nevertheless, these issues have been fully briefed in exhaustive detail by the parties, and therefore, in the interests of completeness and efficiency, the Court's analysis of SUMCO's anticipation defense is set forth below.

#### 1. Claim Charts

As a preliminary matter, with respect to SUMCO's affirmative defense of anticipation, MEMC argues that SUMCO should be precluded from relying on this theory because SUMCO's claim charts for the prior art references fail to satisfy Patent Local Rule 3-3(c). In particular, MEMC takes issue with the charts for References 1, 3-4, and 6-14.[14] In response, SUMCO argues that MEMC's objections to SUMCO's claim charts are without merit and are untimely.

The Court agrees with SUMCO and therefore declines to preclude SUMCO from relying on the prior

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[14] MEMC concedes that the claim charts for Reference 2 and 5 are sufficient.

art references identified in its Revised Final Invalidity Contentions. On November 13, 2003, in response to MEMC's Motion to Strike Defendants' Preliminary and Final Invalidity Contentions, the Court found that SUMCO's claim charts violated the specificity requirements of Patent Local Rule 3-3(c). However, SUMCO was granted leave to file revised invalidity contentions containing new claim charts. As directed by the Court, SUMCO revised its claim charts and served its Revised Final Invalidity Contentions on January 12, 2004. Both MEMC and SUMCO subsequently filed cross-motions for summary judgment. MEMC did not criticize SUMCO's claim charts in either its own motion for summary judgment or in its response to SUMCO's motion for summary judgment. Additionally, and more significantly, when the case was remanded to this Court for further proceedings, the Court held a Case Management Conference on September 22, 2005, and thoroughly discussed all of the relevant case scheduling issues with the parties. Despite this fact, and the fact that a significant amount of time had elapsed since the date that MEMC was served with SUMCO's Revised Final Invalidity Contentions, MEMC did not notify SUMCO, or the Court, that it intended to object to SUMCO's Revised Final Invalidity Contentions pursuant to Patent Local Rule 3-3(c) until it filed the instant Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense on *December 6, 2005*. MEMC's current objections to the Revised Final Invalidity Contentions are therefore decidedly untimely.

Further, MEMC's objections to SUMCO's claim charts are unpersuasive. The Court finds that

SUMCO's claim charts provide MEMC with sufficient notice as to how SUMCO contends that each element of each asserted claim is found in the particular prior art reference. Specifically, the charts contain written comparisons, as well as references to testimony by expert witnesses who purportedly compared each element of each asserted claim with the specific items of prior art. *See* Mathiowetz Decl. ISO Mot. re Invalid. at Ex. 4 (Revised FICs). For example, the claim chart for Reference No. 1 refers to the attached Submission of Publications which provides a comprehensive comparison of each element of each asserted claim. *Id.* Similarly, with respect to Reference No. 3, the claim chart incorporates a description of the reference on pages 19-20 from the attached Submission of Publications. *Id.* Regarding Reference No. 4, the claim chart includes a supplementary explanation that specifically incorporates testimony by Park, Eidenzon, Wildes, and King. *Id.* Similarly, the claim charts for Reference Nos. 6-14 incorporate the testimony of Eidenzon and Puzanov and cite to specific paragraphs in Eidenzon's expert report.[15] *Id.* Accordingly, MEMC's objections to the Revised Final Invalidity Contentions are without merit. The Court will therefore proceed to the next step of the analysis, which is a determination of whether any of the prior art references anticipate the '302 Patent, thereby rendering it invalid.

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[15] The depositions of Eidenzon and Puzanov were taken in the fall of 2002, well before MEMC received the Revised Final Invalidity Contentions.

## 2. Anticipation by Prior Art References

Under 35 U.S.C. § 102, a person shall be entitled to a patent unless:

> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
>
> . . .
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; or
>
> (f) he did not himself invent the subject matter sought to be patented, or

> (g)(1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

35 U.S.C. § 102.

In its Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO asserts that there are four relevant prior art publications that invalidate the '302 Patent under 35 U.S.C. § 102(a) and (b): (1) Reference No. 2, which is a publication entitled "Growth Parameters Determining the Type of Grown-In Defects in Czochralski Silicon Crystals;" (2) Reference No. 5, which is a publication entitled "Classification of Grown-In Microdefects in Czochralski-Grown Silicon Crystals;" (3) Reference No. 6, which is Dr. Puzanov's 1987 Thesis Defense; and (4) Reference No. 7, which is a publication entitled

"Defect-free Silicon Crystals Grown by the Czochralski Technique."[16]

With respect to anticipation under 35 U.S.C. § 102(e), (f), and (g), there is only one relevant prior art reference that SUMCO contends invalidates the '302 Patent. This reference is Reference No. 4, which is U.S. Patent No. 6,045,610 (the "'610 Patent").

Although considered a question of fact, anticipation is appropriate for summary judgment if no genuine issue of material fact exists. *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1327 (Fed. Cir. 2001) (affirming summary judgment of invalidity where "no reasonable jury could find" the patent valid in light of the prior art). In order for SUMCO's § 102 affirmative defense to be successful, "each and every" element of the asserted claims must be found in a single prior art reference by clear and convincing evidence. *Union Oil Co. of Cal. v. Atlantic Richfield Co.*, 208 F.3d 989, 994-95 (Fed. Cir. 2000). If there is even one claim element missing in a reference asserted by SUMCO, its invalidity defense under § 102 as to that reference must fail. "The law imposes this high burden because [the '302 Patent], like any issued patent, enjoys a presumption of validity." *Id.* at 995.

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[16] In its Motion for Summary Judgment of Non-Infringement and Invalidity, SUMCO also contends that the asserted claims of the '302 Patent are anticipated by an article published by Voronkov in 1996 (the "Voronkov article"). As MEMC points out, SUMCO's Final Revised Invalidity Contentions do not include the Voronkov article. As such, SUMCO is precluded from relying on this reference in support of its invalidity contentions and SUMCO's arguments pertaining to this reference have been disregarded.

### a. Prior Art References that Have Been Abandoned by SUMCO

In its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense, MEMC argues that SUMCO has not established, by clear and convincing evidence, that any of the fourteen prior art references anticipate the '302 Patent. SUMCO's Opposition fails to respond to certain arguments asserted by MEMC and thus it appears that SUMCO has abandoned its reliance on certain prior art references. Because SUMCO's concessions narrow the disputed issues before the Court, MEMC's arguments regarding these prior art references will be discussed first.

#### 1. Reference No. 1: Unexamined Patent Application No. Hei 8-330316

Reference No. 1 is Unexamined Patent Application No. Hei 8-330316. *See* Mathiowetz Decl. ISO Mot. re Invalid. at Ex. 4 (Revised FICs at 9). SUMCO contends that this reference was published on December 13, 1996. *Id.*

As noted above, SUMCO does not rely on Reference No. 1 in support of its Motion for Summary Judgment of Non-Infringement and Invalidity. However, since MEMC has moved separately for summary judgment that Reference No. 1 does not render the '302 Patent invalid, the Court must make a determination with regard to this prior art reference.

MEMC argues that Reference No. 1 does not render the '302 Patent invalid because it fails to disclose a vacancy dominated, agglomerate-free region. Further, MEMC asserts that SUMCO's expert has admitted that Reference No. 1 does not provide enough information for him to conclude that this region was vacancy dominated as required by the asserted claims. SUMCO utterly fails to respond to any of MEMC's arguments, even though it is SUMCO's burden to produce evidence in support of its own affirmative defense. Thus, the Court hereby determines that Reference No. 1 does not anticipate the '302 Patent as a matter of law.

### 2. Reference No. 3: Park's Article "Effect of Crystal Defects on Device Characteristics"

Reference No. 3 is an article by Park entitled "Effect of Crystal Defects on Device Characteristics," which was published at the Proceeding of 2nd International Symposium on Advanced Science and Technology of Silicon Material on November 25 through 29, 1996.

Like Reference No. 1, SUMCO has not relied on Reference No. 3 in support of its Motion for Summary Judgment of Non-Infringement and Invalidity. However, since MEMC has moved separately for summary adjudication that Reference No. 3 does not render the '302 Patent invalid, the Court must consider MEMC's arguments. In support of its Motion, MEMC argues that Reference No. 3 fails to disclose a vacancy dominated, agglomerate-free region. MEMC also argues that Figure 15 in Reference No. 3 is simply

a schematic diagram depicting the initial concentration and type of point defects as a function of the ratio v/G. Thus, Figure 15 does not disclose every limitation of the asserted claims of the '302 Patent, as SUMCO contends. Again, SUMCO fails to provide any argument in opposition to MEMC's Motion. Accordingly, the Court finds, as a matter of law, that Reference No. 3 is not statutory prior art that anticipates the '302 Patent.

#### 3. Reference No. 14: Russian Text Book Excerpt

Reference No. 14 is a 1988 Russian text book excerpt identified by SUMCO as "Defendants' deposition Exhibit 22-a textbook published in 1988." MEMC argues that Reference No. 14 fails to disclose a vacancy dominated, agglomerate-free region or a silicon wafer. Again, SUMCO fails to provide any response to MEMC's argument. Accordingly, the Court finds, as a matter of law, that Reference No. 14 is not statutory prior art that anticipates the '302 Patent.

### b. Other 35 U.S.C. § 102(a) and (b) Prior Art References

As to the remaining 35 U.S.C. § 102(a) and (b) prior art references, SUMCO has either responded to MEMC's summary judgment motion, or has independently moved for summary judgment with regard to that prior art reference. Each reference is discussed below. However, as set forth in greater detail in the following discussion, with respect to these remaining prior art references, SUMCO has utterly failed to carry its burden of proof and has not shown

either that: (1) it is entitled to judgment as a matter of law that the references anticipate each and every claim limitation of the '302 Patent, or (2) that there are genuine issues of fact precluding summary judgment in MEMC's favor.

### 1. Reference No. 2: The 1995 Hourai Article

Reference No. 2 is an article by M. Hourai and others entitled "Growth Parameters Determining the Type of Grown-In Defects in Czochralski Silicon Crystals." *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 31. According to SUMCO, the article was published in *Materials Science Forum*, Volumes 196 to 201, in 1995. SUMCO has moved for summary judgment in its favor that Reference No. 2 anticipates the '302 Patent. MEMC has also moved for summary judgment in its favor that Reference No. 2 does not anticipate the '302 Patent.

In particular, MEMC has set forth evidence in support of its argument that Reference No. 2 does not anticipate any of the asserted claims of the '302 Patent since it fails to disclose a vacancy dominated, agglomerate-free region. *See* Mathiowetz Decl. ISO Mot. re Invalid. at Ex. 13 (Second Falster Decl. at ¶ 31). As stated by Falster, Reference No. 2 identifies four regions (Regions I to IV) in the silicon being analyzed. *Id.* Region IV is the only region shown to have "defect free" silicon, and then only to the extent of the open square boxes shown in Figure 5. *Id.* Since Region IV is dominated by interstitial point defects, and not vacancy point defects as required by the asserted claims of the '302 Patent, Falster contends

that Region IV could never anticipate any of the asserted claims. *Id.* at Ex. 13 (Second Falster Decl. at ¶ 32). Additionally, according to Falster, none of Regions I through III is described as being "defect free." *Id.* Rather, on the last page of the exhibit, Regions I through III are described as being "vacancy related defect regions." *Id.* Accordingly, nothing in this reference anticipates the vacancy dominant silicon substantially free of agglomerated vacancy intrinsic point defects required by the asserted claims. *Id.* at Ex. 13 (Second Falster Decl. at ¶ 33). MEMC also points out that the article fails to indicate whether Region III was ever tested for defects. A failure to test the required regions in the silicon is fatal to SUMCO's invalidity argument because it leaves open the question of whether the silicon has less than about 1000 defects/cm3.

In response, SUMCO argues that Reference No. 2 "clearly shows two regions which are vacancy-dominant with low agglomerates," namely, Region II and Region III. SUMCO then cites to the following conclusory testimony from its expert, Eidenzon, which it contends "proves" that Reference No. 2 meets each and every limitation of the asserted claims of the '302 Patent:

> This publication demonstrates that agglomerate defect-free zones in large diameter silicon crystals were well known before the '302 patent application was filed. This publication investigates the growth rate and axial temperature gradient, the V/G ratio, and the influence of this parameter on the distribution of microdefects. The publication shows

> agglomerate defect-free zones along the crystal axis (e.g., Region III, vacancy dominant agglomerate free). In my opinion, [Reference No. 2] teaches the claim limitations from the asserted claims of the '302 patent.

*See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 7 (Eidenzon Decl. at ¶ 20). However, since this testimony merely asserts, without any analysis, that the critical claim limitations are found in the prior art, it is insufficient to preclude summary judgment in MEMC's favor. *Collins v. Northern Telecom Ltd.*, 216 F.3d 1042, 1047 (Fed. Cir. 2000).

SUMCO also directs the Court's attention to the "Declaration of Dr. Jea-Gun Park, filed as Exhibit D18 to SUMCO's Reply to Summons in the Opposition Division of the European Patent Office" and the "Declaration of Dr. Anna Eidenzon, filed as Exhibit D17 to SUMCO's Reply to Summons in the Opposition Division of the European Patent Office."[17] *See* Powers Decl. ISO Opp. to Mot. re Invalid. at Exs. 33, 34. Having reviewed these documents, the Court concludes that these Declarations are also insufficient to meet SUMCO's burden of proof. First, as MEMC points out, the Declarations actually *undermine* SUMCO's position that Reference No. 2 "clearly" shows two regions "substantially free of agglomerated

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[17] Additionally, SUMCO argues that patent claims "identical" to the ones asserted here were rejected by the Japanese Patent Office based on this prior art reference. However, SUMCO does not provide the Court with any support or evidence for this argument and therefore it has been disregarded.

defects" since the issue of whether these Regions are free of defects is obviously a matter of considerable dispute in the European patent proceedings. Second, Eidenzon's Declaration makes clear that Eidenzon's opinion is with regard to whether Region III is a "vacancy type region that is substantially free of agglomerated point defects **as *those words are defined by the '094 patent.***" *See* Powers Decl. ISO Opp. to Mot. re Invalid. at Ex. 34 at p. 16 (emphasis added). As such, Eidenzon's opinion is of no assistance to the Court in the instant proceedings. With respect to Reference No. 2, summary judgment in MEMC's favor is therefore GRANTED.

### 2. Reference No. 6: Nikolai Puzanov's 1987 Thesis Defense

Reference No. 6 is the "Thesis defense by Nikolai Puzanov at the Moscow Institute of Steel and Alloys in 1987." As an initial matter, MEMC is correct that SUMCO has offered no evidence that this thesis defense is a "printed publication" within the meaning of 35 U.S.C. § 102(a) and (b). Indeed, the only evidence that SUMCO has produced to the Court that pertains to Reference No. 6 is: (1) an unpublished review of the thesis, written by Professor M.G. Milvidskii; (2) the Declaration of Eidenzon; (3) three photographs of the inventors; and (4) SUMCO's own claim charts. *See* Powers Decl. ISO Mot. re Non-Infring. at Exs. 7, 23-24, 34A. While SUMCO contends that the unpublished review of Dr. Puzanov's dissertation proves that Puzanov's "[m]ain scientific results [were] published in scientific periodicals and presented at representative meetings and conferences," SUMCO has not provided any of these periodicals or publications to the Court.

Without the alleged printed publication itself, the Court has no basis for finding that Reference No. 6 is prior art within the meaning of 35 U.S.C. § 102(a) or (b).

Further, even considering the evidence that SUMCO *has* submitted to the Court, it is apparent that the evidence is utterly deficient to meet SUMCO's burden of proof. For example, although SUMCO boldly states that "[t]he unrefuted evidence clearly and convincingly establishes that each of the claimed elements from the asserted claims are found in the defect-free crystal that Dr. Eidenzon and Dr. Puzanov made and published in 1986 and 1987, respectively," the portion of Eidenzon's testimony that SUMCO relies on to support this assertion is as follows:

> The agglomerate defect-free crystal we created in 1986 included a first axially symmetric region in which vacancies are the predominant intrinsic point defect.' The vacancy dominant region of the crystal was substantially free of agglomerated vacancy intrinsic point defects.' The region also comprised the central axis or has a width of at least about 15 mm.' Further, the crystal contained a second axially symmetric region in which silicon self-interstitial atoms are the predominant intrinsic point defect and which is substantially free of agglomerated silicon sel-interstitial intrinsic point defects.' Each of the claimed elements from the asserted claims of the '302 patent are

> found in the defect-free crystal that Nikolai Puzanov and I made and published in 1986.

*See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 7 (Eidenzon Decl. at ¶ 8).

Again, this type of unsupported[18] and conclusory testimonial evidence does not create a genuine issue of fact. It is commonly accepted that "a party may not avoid summary judgment simply by offering an opinion of an expert that states, in effect, that the critical claim limitation is found in the accused device." *Collins*, 216 F.3d at 1047. As such, the Eidenzon's testimony does not establish a genuine issue of fact sufficient to defeat MEMC's summary judgment motion.

Critically, Eidenzon does not support her assertion that the claim limitations are met by the prior art with any explanation as to *why* it meets those limitations or *how* Eidenzon knows that it meets those limitations. *Collins*, 216 F.3d at 1046. Indeed, Eidenzon's only testimony with respect to *how* she knows that the crystal was, in fact, free of agglomerated defects is her assertion that "she is familiar with the detection limits

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[18] To the extent that such corroborating evidence exists, SUMCO is responsible for identifying it in the instant motions. "It is not the trial judge's burden to search through lengthy technologic documents for possible evidence." *Biotec Biologische Naturverpackungen GmbH & Co. KG v. Biocorp, Inc.*, 249 F.3d 1341, 1353 (Fed. Cir. 2001). "The public interest in invalidating invalid patents does not override the well established procedure requiring the nonmovant to come forward with evidence sufficient to negate the movant's position." *Id.*

that are described in the '302 patent" and "used the same *or similar methods* for evaluating the 1986 crystal that [they] had created." Powers Decl. ISO Mot. re Non-Infring. at Ex. 7 (Eidenzon Decl. at ¶ 7) (emphasis added). In an apparent effort to further "clarify" which methods were used, Eidenzon states that she and Puzanov "determined that the crystal [they] made was agglomerate defect-free by using copper decoration and infrared microscopy [and that] X-ray topography was also taken [and that] [o]ther samples were investigated by using gold diffusion and X-ray topography." *Id.* at Ex. 7 (Eidenzon Decl. at ¶ 6). In light of the fact that SUMCO has submitted literally hundreds of pages of briefing and evidence to this Court in which it has argued in painstaking detail that scientific testing relating to silicon ingots and wafers must be conducted according to precise and objectively verifiable methodology, the fact that SUMCO expects the Court to just *assume* that Eidenzon's testimony is reliable, scientific, and verifiable *evidence* that the prior art crystal was, in fact, free of agglomerated defects is simply stunning. It is also insufficient to carry SUMCO's burden of proof.

Further, MEMC has shown that Reference No. 6 fails to disclose a vacancy dominated, agglomerate-free region because Puzanov has admitted that the silicon ingot described in his thesis "demonstrated very high thermal stability" and an "absence of the centers of oxygen precipitation." *See* Mathiowetz Decl. ISO Mot. re Invalid. at 20 (Puzanov Depo. at 69:14-71:3). According to MEMC's expert, these admitted test results show that the ingot was interstitial dominated, not vacancy dominated as required by the asserted

claims. *See id.* at Ex. 13 (Second Falster Decl. at ¶ 27). SUMCO does not offer any evidence to refute this. Thus, for all of the aforementioned reasons, the Court concludes that Reference No. 6 does not anticipate any of the asserted claims of the '302 Patent.

### 2. Reference Nos. 5, 7-8, and 11-13: The Eidenzon and Puzanov References

In both of the summary judgment motions pertaining to SUMCO's invalidity affirmative defense, the parties discuss Reference Nos. 5, and 7 through 13[19] in conjunction and collectively refer to these prior

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[19] Reference No. 5 is an article by Eidenzon and Puzanov entitled "Classification of Grown-In Microdefects in Czochralski-Grown Silicon Crystals." According to SUMCO, the article was received by *Inorganic Materials* on October 20, 1994 and was published in 1995. Reference No. 7 is an article by Eidenzon and Puzanov entitled "Defect-Free Silicon Crystals Grown by the Czochralski Technique," received by *Inorganic Materials* on February 16, 1996. Reference No. 8 is an article by Eidenzon and Puzanov entitled "The effect of thermal history during crystal growth on oxygen precipitation in Czochralski-grown silicon," published in *Semicond. Sci. Technol. 7* in 1992. Reference No. 9 is an article by Eidenzon and Puzanov entitled "Formation of the bands of anomalous oxygen precipitation in Czochralski grown Si Crystals," published in *Journal of Crystal Growth* in 1994. Reference No. 10 is a 1986 Russian publication by Eidenzon and Puzanov. Reference No. 11 is an article by Puzanov entitled "Modeling point-defect distribution in dislocation-free Si crystals grown from the melt," published in *Inorganic Materials* in 1996. Reference No. 12 is an article by Eidenzon and Puzanov entitled "Selective interaction of twin boundaries with vacancies and self-interstitials in disclocation-free Si tetracrystals," published in

art references as the "Eidenzon and Puzanov References." As such, except where expressly noted, the following discussion will also refer to the Eidenzon and Puzanov References collectively.

SUMCO has moved for summary judgment that Reference Nos. 5 and 7 anticipate the '302 Patent as a matter of law. MEMC has opposed SUMCO's motion, and has filed its own summary judgment motion in which it contends that all of the Eidenzon and Puvanov References are not prior art as a matter of law.

SUMCO argues that each of the claimed elements from the asserted claims of the '302 Patent are found in Reference No. 5. *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 7 (Eidenzon Decl. at ¶¶ 15-17, 27-28), Ex. 29. Specifically, SUMCO notes that Figure 4 of Reference No. 5 shows several vacancy and interstitial defect-free regions along the crystal axis. SUMCO further argues that all of these figures contain agglomerate defect-free zones. Referring to Figure 5 of Reference No. 5, SUMCO contends that the LTC area is, in fact, an area free of agglomerated vacancy defects. SUMCO also argues that the denotation "B" refers to an interstitial type area that is free from agglomerated point defects.

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*Journal of Crystal Growth* in 1997. Reference No. 13 is an article by Eidenzon and Puzanov entitled "Harmful microdefects in the seed-end portion of large-diameter silicon ingots," published in *Inorganic Materials* in 1997.

With respect to Reference No. 7, SUMCO also contends that each of the claimed elements from the asserted claims of the '302 Patent are found in the prior art because Figure 3 of the prior art publication "shows both vacancy-dominant and interstitial dominant regions," and the vacancy dominant region "is more than 15 mm wide and substantially free of agglomerated point defects." *See* Powers Decl. ISO Mot. re Non-Infring. at Ex. 7 (Eidenzon Decl. at ¶ 10), Ex. 27.

However, in general, with respect to all of these prior art references, MEMC explains that the references pertain to Eidenzon and Puzanov's studies in the 1980's and 1990's, whereby Eidenzon and Puzanov studied crystals that were grown under various experimental growth conditions such as ramped pull rates, step change pull rates, halted crystals, co-doped crystals, and quenched crystals. *See* Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Exs. 24-31. According to MEMC, the publications show that Eidenzon and Puzanov identified defect regions containing five types of micro-defects, A, A′, D, alpha, and LTC. *See id.* at Ex. 24. Throughout all of the papers that Eidenzon and Puzanov published, only one region was identified as being "defect free." *Id.* at Ex. 25. This region was described as being "thermally stable," *i.e.*, it did not precipitate oxygen when subjected to oxygen heat treatments. *Id.* Thus, even according to Eidenzon and Puzanov, none of the defect regions observed by them was vacancy dominant. *Id.* at Ex. 25 at 222. Further, based on Eidenzon and Puzanov's publications, one skilled in the art would only be able to conclude that all regions containing A, A′, B, alpha, and LTC microdefects are silicon crystal

regions to be avoided when producing silicon for the semiconductor industry.

MEMC further argues that SUMCO's expert, Wildes, has admitted that the Eidenzon and Puzanov References do not disclose a *single crystal silicon wafer*. *See* Mathiowetz Decl. ISO Mot. re Invalid. at Ex. 16 (Wildes Depo. at 201:25-202:16; 239:7-11; 254:11-16). SUMCO does not refute this point. Thus, since all of the asserted claims require a single crystal silicon wafer, none of the disputed claim limitations is found in the Eidenzon and Puzanov References and the References cannot anticipate the '302 Patent as a matter of law.

Additionally, and quite significantly, as MEMC also points out, when SUMCO was defending its own patent in the Japanese Patent Office, SUMCO was confronted with the Eidenzon and Puzanov References and explicitly stated that the articles should be disregarded because they only describe experiments with silicon and were not intended to show the production of ingots for making wafers. For example, SUMCO stated:

> The patentee does not deny that there are some descriptions in the cited references 1 to 8 that teach or suggest that the defects-free region is formed at a portion to the crystal-axis direction. However, all these techniques for forming the defects-free region are conducted under irregular growth conditions (with an operation change along the axis-direction such as the abrupt change of a pulling-up speed and the stopping or quasi-stopping of the pulling-up)

> which is not likely be [sic] adopted in the real growing process for single-crystal silicon.

*See* Mathiowetz Decl. ISO Opp. to Mot. re Non-Infring. at Ex. 35. Such an admission by SUMCO proves that the Eidenzon and Puzanov References fail to teach a person skilled in the art how to make a silicon wafer of any defect profile, much less a wafer having a vacancy-dominated region substantially free of agglomerated vacancy intrinsic point defects as required by each of the asserted claims. Again, SUMCO does not even attempt to refute this point in any of the papers that it has filed with the Court.

Accordingly, based on the undisputed evidence, the Court finds that MEMC is entitled to summary judgment in its favor that Reference Nos. 5 and 7 through 13 do not anticipate the '302 Patent.

**c. Anticipation Under 35 U.S.C. § 102(e), (f), and (g)**

**1. The '610 Patent**

The prior art reference that is at the heart of the parties' dispute with regard to anticipation under 35 U.S.C. § 102(e), (f), and (g) is Reference No. 4, which is the '610 Patent. By asserting the '610 Patent as prior art, SUMCO bears "the burden of persuasion by clear and convincing evidence on all [of the] issues relating to the status of the ['610 Patent] as prior art." *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576 (Fed. Cir. 1996).

### a. 35 U.S.C. § 102(e)

Under 35 U.S.C. § 102(e), a patent is invalid if there is another issued patent published before the priority date of the first patent that discloses the same invention. 35 U.S.C. § 102(e). A patent's effective date as a prior art reference is the date on which it was filed in the United States. *See id.* The '610 Patent was filed in the United States on December 12, 1997 and therefore preceded the '302 Patent, which was filed on September 8, 1998. MEMC, however, contends that it is entitled to an earlier priority date – *i.e.* September 12, 1997 – because September 12, 1997 was the date that the inventors of the '302 Patent purportedly reduced the patent to practice. Although the Court concludes that MEMC is not entitled to either a September 12, 1997 priority date *or* a September 8, 1998 priority date due to the fact that the '302 Patent is non-enabling,[20] and due to the insufficiency of MEMC's evidence pertaining to the September 12, 1997 reduction to practice, all of the parties' arguments regarding the '610 Patent are set forth below.

First, in order to ascertain whether the '610 Patent anticipates the '302 Patent under 35 U.S.C. § 102(e), the Court must make two determinations: (1) whether

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[20] Pursuant to 35 U.S.C. § 112, for a patent application to constitute a constructive reduction to practice, it must enable one of ordinary skill in the art to make and use the invention, meet the written description test, and set forth the best mode of invention. *See* 35 U.S.C. § 112; *see also Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1560 (Fed. Cir.1991).

the '302 Patent was actually reduced to practice[21] prior to the filing date for the '610 Patent; and (2) whether the '610 Patent discloses the same invention. To prove an actual reduction to practice, MEMC needs to show that: (1) it constructed an embodiment that met all the limitations of the asserted patent claims; and (2) it determined that the invention would work for its intended purpose. *Taskett v. Dentlinger*, 344 F.3d 1337, 1340 (Fed. Cir. 2003); *see also Estee Lauder Inc. v. L'Oreal, SA*, 129 F.3d 588, 592 (Fed. Cir. 1997) (holding that, to prove actual reduction to practice, "an inventor must establish that he actually prepared the composition and knew it would work.'"). MEMC asserts that it created silicon wafers having all the elements of 1-6 and 11 in August 1997 and tested these wafers and appreciated their novel characteristics no later than September 12, 1997.

To show that MEMC constructed an embodiment of the '302 Patent that met all of the limitations of the asserted claims, MEMC relies on the following

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[21] In evaluating priority, the Court may consider both the date of "conception" and the date of "reduction to practice." *Burroughs Wellcome Co. v. Barr Lab. Inc.*, 40 F.3d 1223 (Fed. Cir. 1994). Actual reduction to practice is the physical construction of an apparatus that works for the intended purpose or the actual carrying out of the steps of a process invention. *Scott v. Finney*, 34 F.3d 1058, 1063 (Fed. Cir. 1994). Conception and reduction to practice are questions of law, based on findings of fact. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986). To establish priority of an invention, a party must show either an earlier reduction to practice, or an earlier conception followed by a diligent reduction to practice. *Price v. Symsek*, 988 F.2d 1187, 1190 (Fed. Cir. 1993).

evidence: (1) testimony from the two inventors, Falter and Holzer; (2) testimony from Mule'Stagno; and (3) certain contemporaneous data.[22]

As noted previously in the discussion pertaining to enablement, evidence of inventive facts must not rest alone on the testimony of the inventor himself. *Cooper v. Goldfarb*, 154 F.3d 1321, 1330 (Fed. Cir. 1998); *Chen v. Bouchard*, 347 F.3d 1299 (Fed. Cir. 2003). Thus, where a party seeks to show conception through the testimony of an inventor, it must produce independent evidence corroborating that testimony. *Price*, 988 F.2d at 1195. Such evidence is to be evaluated under a "rule of reason." *Id.* The "rule of reason" addresses the concern that a party claiming inventorship might be tempted to describe his actions in an unjustifiably self-serving manner in order to obtain a patent or to maintain an existing patent. *Id.* Thus, according to the applicable standard, since Falster, Holzer, and Mule'Stagno are all interested parties, the Court cannot rely on Falster, Holzer, or Mule'Stagno's testimony that Falster and Holzer reduced the '302 Patent to practice in September 12, 1997 unless such testimony is corroborated.

The "corroborating" evidence that MEMC has produced, which is data pertaining to certain ingots purportedly produced and tested in September 1997, however, does not show: (a) that wafers having the characteristics of the asserted claims were produced in

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[22] This data is found at Exhibit 39 to the Powers II Declaration, filed in support of SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity.

August 1997, or that claims 1 through 6 and 11 were reduced to practice; (b) that ingot 77GCD was produced according to the cooling method described in the '302 Patent; (c) that the ingot had a vacancy-dominant and agglomerated vacancy defect-free region; (d) that the inventors grew ingot 77GCI according to the cooling method described in the '302 Patent using a standard hot zone; or (e) that Holzer or Falster realized that they had successfully produced wafers having the characteristics of the asserted claims. Indeed, as SUMCO has noted, MEMC's evidence tends to suggest that the ingots did not meet the asserted claim limitations, since MEMC's evidence indicates that the ingots contained a vacancy-rich central region with agglomerates. *See* Powers Decl. II ISO Mot. re Non-Infring. at Ex. 39. Further, since Mule'Stagno's testing has been found to be inadmissible due to its unreliability, there is no competent evidence before the Court indicating that the ingots were tested and found to possess the required characteristics. Further, the corroborating evidence does not show that Falster or Holzer appreciated that the ingots met the claim limitations of the '302 Patent. Under the applicable standard, there must be contemporaneous recognition and appreciation of the limitations of the claimed invention, the invention cannot be the mere result of fortuitous happenstance. *See Estee Lauder, Inc.*, 129 F.3d at 593; *See Mycogen Plant Science v. Monsanto Co.*, 243 F.3d 1316, 1336 (Fed. Cir. 2001). Since the contemporaneous records that MEMC has identified do not provide any clarity into this issue, the Court cannot conclude, as a matter of law, that MEMC is entitled to the September 12, 1997 priority date.

In order to determine whether summary judgment can be granted in SUMCO's favor with respect to SUMCO's 35 U.S.C. § 102(e) invalidity affirmative defense, however, the Court must also complete the second step of the analysis, which is whether the '610 Patent discloses each and every asserted element of the '302 Patent. On this issue, SUMCO bears the burden of proof by clear and convincing evidence. Here, SUMCO's evidence is neither clear nor convincing. Indeed, the sum total of SUMCO's evidence with regard to the relationship between the '610 Patent and the '302 Patent consists of: (1) certain inadmissible and irrelevant "admissions" purportedly made by MEMC during settlement negotiations pertaining to a separate trade secret dispute between the parties; (2) Park's self-serving testimony concerning his own invention; and (3) Eidenzon's and King's conclusory and unsupported "corroborating" testimony.

Specifically, SUMCO first relies on the fact that MEMC purportedly "admitted" that "the technology ('invention') covered by the Park application is the same as the technology ("invention") covered in MEMC's patent specification." *See* SUMCO Opp. to Mot. re Invalid. at 6:8-11. In support of this assertion, however, SUMCO cites to a letter drafted by MEMC's counsel that plainly states on its face: "pursuant to Rule 408 of the Federal Rules of Evidence, this letter shall be inadmissible in any legal proceedings between the companies."[23] *See* Powers Decl. ISO Opp. to Mot. re

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[23] SUMCO also relies on a MEMC slide presentation that states "Park/SEC file perfect/pure silicon patent applications." *See id.* at Ex. 11. It is quite inconceivable to the Court how SUMCO can

Invalid. at Ex. 10. Further, even if the Court were to consider this letter as admissible evidence, which it is not, MEMC has convincingly shown that the letter pertains to other MEMC patents, and that the letter's author does not directly compare the '302 Patent to the '610 Patent. *See id.*

Moreover, SUMCO cannot merely rely on the fact that MEMC has accused certain wafers, which may or may not have been made according to the '610 Patent, of infringement in order to establish that the '610 Patent invalidates the '302 Patent. As stated by the Federal Circuit in *Tate Access Floors v. Interface Architectural Resources*, 279 F.3d 1357, 1367 (Fed. Cir. 2002):

> [A]ccused infringers are not free to flout the requirement of proving invalidity by clear and convincing evidence by asserting a "practicing prior art" defense to literal infringement under the less stringent preponderance of the evidence standard . . . it is the presence of the prior art and its relationship to the claim language that matters for invalidity.

*Id.*

Further, with respect to SUMCO's expert testimony regarding the relationship between the '610 Patent and the '302 Patent, SUMCO's "evidence" falls

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seriously contend that this statement "proves" that each and every asserted claim of the '302 Patent is met by the '602 Patent. As such, the Court finds this argument unpersuasive.

considerably short of the mark. First, SUMCO relies on the testimony of the '610 Patent's inventor, Park. However, as the Federal Circuit has noted, "[t]he law has long looked with disfavor upon invalidating patents on the basis of mere testimonial evidence absent other evidence that corroborates that testimony." *Finnegan Corp. v. Int'l Trade Comm'n*, 180 F.3d 1354, 1366 (Fed. Cir. 1999). This is due to the fact that it is widely recognized that uncorroborated testimony concerning invalidating activities is unsatisfactory due to "the forgetfulness of witnesses, their liability to mistakes, their proneness to recollect things as the party calling them would have them recollect them, aside from the temptation to actual perjury." *The Barbed-Wire Patent*, 143 U.S. 275, 284 (1892). Further, Park's Declaration does not provide any guidance as to whether the regions disclosed in the '610 Patent are "substantially free from agglomerated point defects," within the meaning of the '302 Patent – *i.e.* less than about 1,000 defects/cm3 – or whether the regions are axially symmetric, within the meaning of the '302 Patent.

As to the corroborating evidence, SUMCO cites to a statement in King's Declaration in which he refers to SUMCO's claim charts and states that "based upon the facts and my review of the evidence, it is my opinion that the asserted claims of the '302 Patent are invalid under 35 U.S.C. § 102(e), (f), or (g)." *See* Powers Decl. ISO Opp. to Mot. re Invalid. at Ex. 9 (King Decl. at ¶ 14). Again, mere assertions that the claim limitations have been met do not create a genuine issue of fact. SUMCO also cites to the Eidenzon Declaration, which is similarly conclusory. *See id.* at Ex. 13. Indeed, the Eidenzon Declaration and the King

Declaration do not even discuss or analyze many of the disputed claim limitations, such axial symmetry.

Moreover, SUMCO fails to produce any evidence in response to MEMC's argument that the '610 Patent fails to disclose a vacancy dominated, agglomerate-free region or that the '610 Patent fails to teach a wafer where such first axially symmetric region comprises the central axis or has a width of at least about 15 mm. Indeed, as MEMC points out, Figures 11 and 12 of the '610 Patent fail to disclose the type of silicon, *i.e.* interstitial or vacancy dominated, that corresponds to the areas marked "P."

Accordingly, although the Court concludes that MEMC has not shown that Falster and/or Holzer reduced the '302 Patent to practice prior to the issuance of the '610 Patent, MEMC is nevertheless entitled to summary judgment in its favor because SUMCO has not shown, through clear and convincing evidence, that each and every asserted claim of the '302 Patent is disclosed in the '610 Patent.

**b. 35 U.S.C. § 102(f)**

Further, SUMCO has produced no evidence pertaining to its 35 U.S.C. § 102(f) affirmative defense. Under § 102(f), a person is not entitled to a patent if "he did not himself invent the subject matter sought to be patented." *See* 35 U.S.C. § 102(f). To prove derivation under § 102(f), the party asserting invalidity must prove "both prior conception of the invention by another and communication of that conception to the patentee by clear and convincing evidence." *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d

1332, 1344 (Fed. Cir. 2003). "The communication must be sufficient to enable one of ordinary skill in the art to make the patented invention." *Id.*

MEMC argues that SUMCO cannot meet this standard because it has no evidence of: (1) any conception by Park of any one of the asserted claims, much less conception of all of the asserted claims; (2) any communication of the conception of the asserted claims to an inventor of the '302 Patent; or (3) any communication sufficient to enable one of ordinary skill in the art to make the invention covered by the asserted claims. SUMCO does not provide any response to these arguments and does not provide the Court with any evidence that establishes that Park communicated his conception of the asserted claims to an inventor of the '302 Patent in a way that would have enabled one of ordinary skill in the art to make an invention covered by the asserted claims. Accordingly, summary judgment is hereby GRANTED in MEMC's favor with respect to SUMCO's 35 U.S.C. § 102(f) invalidity defense.

**c. 35 U.S.C. § 102(g)**

Under 35 U.S.C. § 102(g)(2), the validity of a patent can be challenged only by providing clear and convincing evidence that "before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it." 35 U.S.C. § 102(g)(2). An inventor can establish that he or she was the first to invent under Section 102(g) by demonstrating either that he or she was the first to reduce the invention to practice or that he or she was the first to conceive of

the invention and then, prior to the other party's conception, exercised reasonable diligence in reducing the invention to practice. *Griffin v. Bertina*, 285 F.3d 1029, 1032 (Fed. Cir. 2002); *The Dow Chem. Co. v. Astro-Valcour, Inc.*, 267 F.3d 1334 (Fed. Cir. 2001); *Slip Track Sys., Inc. v. Metal-Lite, Inc.*, 304 F.3d 1256 (Fed. Cir. 2002).

MEMC argues that SUMCO cannot meet this standard because it has no evidence that Park's "prior invention" activities occurred in this country. To the contrary, it is quite clear from the parties' submissions that Park conducted his inventive activities exclusively in Korea or Japan. As such, summary judgment is hereby GRANTED in MEMC's favor with respect to SUMCO's 35 U.S.C. § 102(g) invalidity defense.

**C. Obviousness Under 35 U.S.C. § 103(a)**

In its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense, MEMC argues that SUMCO has not shown, and cannot show, that the '302 Patent is invalid as obvious under 35 U.S.C. § 103(a).

Again, because the asserted claims of the '302 Patent are presumed valid, SUMCO must put forth clear and convincing evidence in support of this invalidity defense. *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1349 (Fed. Cir. 2001). Specifically, SUMCO must prove that the differences between the invention of the asserted claims and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a

person having ordinary skill in the art." 35 U.S.C. § 103 (a).

As MEMC points out, when opposing MEMC's prior motion to strike SUMCO's invalidity contentions, SUMCO asserted that it was alleging that *each* prior art reference identified in its Preliminary and Final Invalidity Contentions rendered the asserted claims obvious *independently*. *See* November 13, 2003 Order at 4:12-20. As such, SUMCO must now come forth with clear and convincing evidence showing a suggestion or motivation to modify the teachings of the prior art reference in such a way so as to yield the claimed invention. *In re Werner Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000). In its Opposition to MEMC's Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense, SUMCO's sole response to MEMC's obviousness argument is that "MEMC's allegations regarding 35 U.S.C. § 103 should be ignored in view of this Court's prior ruling." Opp. at 5.[24] However, this Court's November 13, 2003 ruling merely addressed the sufficiency of SUMCO's Preliminary and Final Invalidity Contentions under the Patent Local Rules. The Court did not analyze the legal sufficiency of the affirmative defense or hold that SUMCO had met its burden of proof with respect to obviousness. Accordingly, SUMCO is required to come forth with both argument *and* evidence in opposition to MEMC's Motion. *See T. W. Elec. Serv.*, 809 F.2d at 630 (nonmoving party must present specific facts

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[24] The Court also notes that SUMCO has not relied on the affirmative defense of obviousness in its own Motion for Summary Judgment of Non-Infringement and Invalidity.

creating a genuine issue of material fact); *see also Collins*, 216 F.3d at 1046 (holding that, in moving for summary judgment on an issue as to which the non-moving party bears the burden of proof, the moving party discharges its initial responsibility by stating the basis for its motion and pointing out that the evidence in the record would be insufficient to avoid a directed verdict). Without any such argument or evidence, the Court finds that SUMCO has utterly failed to demonstrate the existence of genuine factual issues sufficient to preclude summary judgment on its obviousness affirmative defense. *Anderson*, 477 U.S. at 250. Thus, summary judgment is hereby GRANTED in favor of MEMC on SUMCO's affirmative defense of obviousness pursuant to 35 U.S.C. § 103(a).

**III. Active Inducement**

Finally, although the Court concludes that SUMCO is entitled to a summary judgment finding in its favor on non-infringement and on invalidity due to lack of enablement, since the parties devoted two separate motions for summary judgment to the issue of active inducement of infringement, the issue merits some discussion.

At the outset, the Court notes that the Federal Circuit has already determined that MEMC has established that a reasonable juror could conclude that SUMCO actively induced Samsung Austin's infringement of the '302 Patent. In fact, the Federal Circuit stated:

> [W]e conclude that there are genuine issues of material fact with respect to whether SUMCO

induced infringement of the '302 patent on the part of Samsung Austin. First, SUMCO had knowledge of MEMC's patent as well as knowledge of Samsung Austin's potentially infringing activities. In addition, there is evidence that SUMCO provides substantial technical support to Samsung Austin in the form of e-mail communications. As noted above in Part II, the series of e-mails between SUMCO and the engineer at Samsung Austin demonstrate that SUMCO works with Samsung Austin to coordinate shipment dates and the quantity of wafers sent in each shipment and that SUMCO makes adjustments in the manufacturing process in order to address problems Samsung Austin encounters with the wafers. Second, there is evidence that during November and December 2002, SUMCO sent a shipment of certain wafers directly to Samsung Austin in order to address technical problems with previously-supplied SUMCO wafers. Third, there is evidence that SUMCO personnel made several on-site visits to Samsung Austin, during which technical presentations on the SUMCO wafers were made. In addition, as noted above, Dr. Coria testified that Samsung Austin will not enter into an agreement o buy wafers from a wafer supplier unless the supplier will also provide Samsung Austin with technical support for the wafers.

. . .

In light of the above evidence of record and viewing this evidence in the light most favorable to MEMC, we are not prepared to hold that a

> reasonable jury could not find intent to induce infringement.

*See MEMC Electronic Materials, Inc.*, 420 F.3d at 1378-79.

Considering this quite clear, and thorough, discussion of the relevant evidence pertaining to MEMC's active inducement claim, and the Federal Circuit's explicit mandate that this Court conduct further proceedings *consistent* with its conclusion that there exists a genuine issue of fact with respect to active inducement of infringement, SUMCO's request that this Court nevertheless disregard the Federal Circuit's opinion and grant summary judgment in its favor is very questionable advocacy indeed. Moreover, the evidence SUMCO has identified in its summary judgment motion only makes it more evident that this is a vigorously disputed, factual issue. For example, the parties have identified conflicting facts and testimony pertaining to, *inter alia:* (1) whether SUMCO provides quality control data regarding the accused wafers to SAS; (2) the extent of an SAS engineer's involvement in the coordination of shipments of the accused wafers from SUMCO; (3) whether SUMCO provides customer service support to SAS; (4) the circumstances surrounding the alleged technical support; (5) the extent of SUMCO's employees' visits to SAS; and (6) SUMCO's alleged investigation of the "edge detection problem."

Due to these numerous factual issues, which are material and remain in dispute, a summary judgment disposition on active inducement would not be appropriate. However, since direct infringement is a

threshold issue, and since MEMC has not met its burden of proof on the issue of direct infringement, the Court hereby DENIES MEMC's separately-filed Motion for Summary Judgment on Active Inducement. Since this renders SUMCO's arguments regarding damages moot, the Court also DENIES SUMCO's Motion for Summary Judgment of Zero Damages AS MOOT.

## CONCLUSION

IT IS HEREBY ORDERED AS FOLLOWS:

1. MEMC's Motion for Summary Judgment Against SUMCO's Invalidity Affirmative Defense [Docket No. 544] is GRANTED IN PART AND DENIED IN PART. Summary judgment in MEMC's favor is DENIED with respect to SUMCO's affirmative defense of enablement. Summary judgment in MEMC's favor is GRANTED on SUMCO's affirmative defense of anticipation. Summary judgment in MEMC's favor is also GRANTED with respect to SUMCO's affirmative defense of obviousness.

2. SUMCO's Motion for Summary Judgment of Non-Infringement and Invalidity of U.S. Patent No. 5,919,302 [Docket No. 505] is GRANTED IN PART AND DENIED IN PART. Summary judgment is GRANTED and judgment shall be entered in SUMCO's favor that the '302 Patent is not infringed. Additionally, SUMCO is entitled to judgment in its favor that the '302 Patent is invalid for lack of enablement. Summary judgment in SUMCO's favor is

DENIED with respect to SUMCO's affirmative defense of anticipation.

3. MEMC's Motion for Summary Judgment against Defendants for Active Inducement of Infringement under 35 U.S.C. § 271(b) [Docket No. 667] is DENIED.

4. SUMCO's Motion for Summary Judgment of Zero Damages Because of No Inducement under 35 U.S.C. § 271(b) [Docket No. 499] is DENIED AS MOOT.

5. SUMCO's Objections to Plaintiff's Evidence Submitted in Support of its Motion for Summary Judgment Against Defendants' Invalidity Affirmative Defense [Docket No. 577] are SUSTAINED IN PART AND OVERRULED IN PART.

6. SUMCO's Objections to Plaintiff's Evidence Submitted in Opposition to Defendants' Motion for Summary Judgment of Non-Infringement and Invalidity [Docket No. 572] are SUSTAINED IN PART AND OVERRULED IN PART.

IT IS SO ORDERED.

Dated: 2/24/06

SAUNDRA BROWN ARMSTRONG
United States District Judge

## APPENDIX C

**UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA**

**No. C 01-4925 SBA**
***(Related to Case No. C 05-2133)***

**[Filed February 24, 2006]**

MEMC ELECTRONIC MATERIALS, INC., Plaintiff,

v.

MITSUBISHI MATERIALS SILICON CORPORATION, et al., Defendants.

### ORDER

[Docket No. 502]

This matter comes before the Court on Defendants' Motion to Exclude the Expert Report and Testimony of Plaintiff's Proposed Expert Luciano Mule'stagno. Having read and considered the arguments presented by the parties in the papers submitted to the Court, the Court finds this matter appropriate for resolution without a hearing. The Court hereby GRANTS Defendants' Motion to Exclude the Expert Report and

Testimony of Plaintiff's Proposed Expert Luciano Mule'stagno [Docket No. 502].

## BACKGROUND

In this patent infringement suit, Plaintiff MEMC Electronics Materials, Inc. ("MEMC") has accused Defendants Mitsubishi Materials Silicon Corp., Mitsubishi Silicon America Corp., Sumitomo Mitsubishi Silicon Corp., SUMCO USA Corp. and SUMCO USA SALES Corp. (collectively, "SUMCO") of actively inducing the infringement of U.S. Patent No. 5,919,302 (the "'302 Patent"). The '302 Patent was issued on July 6, 1999 and claims an invention related to the manufacture of silicon crystals for use in pure silicon wafers.

The asserted claims from the '302 Patent, claims 1-6 and 9-12, are directed to a silicon wafer that contains a "first axially symmetric region in which vacancies are the predominant intrinsic point defect and which is substantially free of agglomerated vacancy intrinsic point defects wherein the first axially symmetric region comprises the central axis or has a width of at least about 15 mm."[1] The claims also require a "second axially symmetric region in which silicon self-interstitial atoms are the predominant intrinsic point defect and which is substantially free of

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[1] Per the Court's *Markman* ruling, "substantially free of agglomerated vacancy intrinsic point defects" means "a concentration of such agglomerated defects which is less than the detection limit of these defects, which is currently about 1000 defects/cm3."

agglomerated silicon self-interstitial intrinsic point defects."

On May 1, 2003, the Court held a claim construction hearing for the purpose of construing the claims of the '302 Patent. On October 17, 2003, MEMC served SUMCO with the expert report of Luciano Mule'Stagno (the "Expert Report"). The Expert Report consisted of the results of testing Mule'Stagno performed on silicon wafers produced during discovery by SUMCO. It comprised seven pages of narrative opinion and almost 500 pages of materials relating to testing methodology and results. Based upon the testing performed and described in the Expert Report, Mule'Stagno concluded that SUMCO's silicon wafers infringe the '302 Patent and U.S. Patent No. 6,287,380 (the "'380 Patent") literally and under the doctrine of equivalents. Up until the disclosure of the Expert Report, MEMC had not alleged infringement of the '380 Patent.

On December 8, 2003, SUMCO filed a Motion to Exclude the Expert Report and Testimony of Plaintiff's Proposed Expert Luciano Mule'Stagno and to Preclude Plaintiff's Infringement Claims ("SUMCO's First Motion to Exclude Expert").

On March 1, 2004, the Court issued an Order granting SUMCO's First Motion to Exclude Expert. The Court granted SUMCO's motion to exclude Mule'Stagno's Expert Report and testimony to the extent that it related to infringement of the '380 Patent. The Court also granted SUMCO's motion to preclude MEMC from pursuing its claim of infringement under the doctrine of equivalents and

SUMCO's motion to bar MEMC from offering any expert report or testimony that SUMCO has infringed the '302 Patent under the doctrine of equivalents. Additionally, the Court granted SUMCO's motion to strike the "claim charts" in Mule'Stagno's Expert Report but denied SUMCO's motion to preclude MEMC's infringement claims.

With respect to Mule'Stagno's Expert Report as it pertained to the '302 Patent, the Court noted several deficiencies that rendered the testimony inadmissible pursuant to Rule 702. Specifically, the Court found that:

> The Report merely identified the tests that Mr. Mule'Stagno used to test the wafers but does not explain in detail the methodology he used to test the wafers. For example, the Report states that '[t]he Light Point Defect Scans performed at sizes greater than 0.12 µm clearly show lots of counts in a region extending from the center to about 10mm from the wafer edge . . . . Looking at these LPD maps, it is clear we are looking at wafers which have a large area covered by COPs which manifest themselves as LPDs in this test.' MEMC's Opp. App. A at ii. It is not evident from this statement how the Light Point Defect Scans are performed, what such scans purport to show and how the results are relevant to Mule'Stagno's conclusions.

March 1, 2004 Order at 11. Additionally, the Court noted that:

The Report also does not demonstrate that the research and analysis supporting the proffered conclusions have been subjected to normal scientific scrutiny through peer review and publication or identify an objective source demonstrating that the methods and premises that he used were generally accepted by or espoused by a recognized minority of scientists in his field. *See Lust by & Through Lust v. Merrell Dow Pharms.*, 89 F.3d 594, 597 (9th Cir. 1996). Mr. Mule'Stagno has submitted a declaration in connection with MEMC's Opposition that states that the test that he used, the bulk microdefect density test ('BMD test'), has been used throughout the silicon industry for 15 years to test silicon. Mathiowetz Decl. Exh. F ¶ 7 5. Furthermore, Mr. Mule'Stagno states that "it is routine practice in the industry to test a single strip of silicon (where the strip starts at the center of the wafer and ends at the outer edge)' in order to characterize the entire wafer. *Id.* But nowhere in his declaration does he point to an *objective* source, such as a learned treatise, the policy statement of a professional association, a published article in a reputable scientific journal or the like, demonstrating that his methods and premises were generally accepted by or espoused by a recognized minority of scientists in his field. *Daubert II*, 43 F.3d at 1319. Without objective verification that any of Mr. Mule'Stagno's methods were reliable, the Court cannot find that the proffered evidence is

> both relevant and reliable as required by *Daubert*.

*Id.*

Pursuant to Federal Rule of Civil Procedure 26(a)(2)(C) and (e)(1), MEMC was given an opportunity to cure the defects in Mule'Stagno's Expert Report by providing objective verification of Mule'Stagno's methodology. In particular, MEMC was directed to show, via objective sources, what Mule'Stagno's tests were, what the results purported to show, and how the results were relevant to the conclusions. MEMC was also instructed to demonstrate, via objective sources, that Mule'Stagno's methodologies were generally accepted by or espoused by a recognized minority of scientists in the field.

In response to the Court's Order, on March 9, 2004, MEMC served SUMCO with the Second Declaration of Mule'Stagno. *See* Powers Decl. ISO Second Mot. to Exclude Expert ("Powers Decl.") at Ex. 3. However, on March 16, 2004, before SUMCO had a chance to respond to the Second Declaration of Mule'Stagno, this Court granted SUMCO's Motion for Summary Judgment of Zero Damages and specifically found that SUMCO was not liable for either direct infringement or inducement of infringement. Accordingly, on April 22, 2004, the court entered a Judgment of Non-infringement. MEMC subsequently appealed.

On August 22, 2005, the Federal Circuit issued its decision on the appeal and held that this Court did not err when it granted summary judgment on the issue of direct infringement. However, the Federal Circuit held

that the Court did err when it granted summary judgment with respect to inducement of infringement because it found that there were genuine issues of material fact with respect to whether SUMCO induced infringement of the '302 Patent on the part of Samsung Austin. Accordingly, the Federal Circuit remanded the case to this Court for further proceedings.

On November 4, 2005, SUMCO filed the instant Motion to Exclude the Expert Report and Testimony of Plaintiff's Proposed Expert Luciano Mule'stagno ("Second Motion to Exclude Expert").

## LEGAL STANDARD

Expert testimony is admissible pursuant to the Federal Rules of Evidence, primarily Rule 702. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 589 (1993). Under *Daubert*, the district court acts as a "gatekeeper," excluding "junk science" that does not meet the standards of reliability required under Rule 702. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 142 (1997); *Kennedy v. Collagen Corp.*, 161 F.3d 1226, 1229-30 (9th Cir. 1998). The trial court accomplishes this goal through a preliminary determination that the proffered evidence is both relevant and reliable. *Daubert*, 509 U.S. at 589-95.

Scientific evidence is deemed reliable if the principles and methodology used by the expert proffering it are grounded in the methods of science. *Id.* at 592-95. In *Daubert*, the Supreme Court gave a non-exhaustive list of factors for determining whether scientific testimony is sufficiently reliable to be

admitted into evidence, including: (1) whether the scientific theory or technique can be (and has been) tested; (2) whether the theory or technique has been subjected to peer review and publication; (3) whether there is a known or potential error rate; and (4) whether the theory or technique is generally accepted in the relevant scientific community. *Id.* at 593-94.

The Ninth Circuit has explained that if an expert did not conduct his or her own research, independent of the litigation, on the subject of the testimony, the district court must determine whether there exists any "objective, verifiable evidence that the testimony is based on 'scientifically valid principles.'" *Daubert v. Merrell Dow Pharms., Inc.*, 43 F.3d 1311, 1317-18 (9th Cir. 1995) ("*Daubert II*"). An expert may demonstrate the scientific validity of a theory or technique by showing that "the research and analysis supporting the proffered conclusions have been subjected to normal scientific scrutiny through peer review and publication." *Id.* at 1318. Alternatively, testifying experts may also show the validity of their theory by explaining "precisely how [the experts] went about reaching their conclusions and pointing to some objective source – a learned treatise, the policy statement of a professional association, a published article in a reputable scientific journal or the like – to show that they have followed the scientific method, as it is practiced by (at least) a recognized minority of scientists in their field." *Id.* at 1319.

The proponent of the expert testimony bears the burden of establishing the testimony's admissibility by a preponderance of the evidence. *Butler v. Home Depot, Inc.*, 984 F.Supp. 1257, 1260 (N.D. Cal. 1997). The

Court's gatekeeper role under *Daubert* requires the Court to make a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue." *Daubert*, 509 U.S. at 592-93.

## ANALYSIS

In its Second Motion to Exclude Expert, SUMCO argues that the Second Declaration and Sixth Declaration of Mule'Stagno do not comply with the Court's March 1, 2004 Order and should therefore be excluded in their entirety. Specifically, SUMCO argues that MEMC has not effectively shown that Mule'Stagno has used scientifically reliable and recognized industry tests to establish whether the accused wafers have an "axially symmetric region," or whether "vacancies are the predominant intrinsic point defect," or whether the wafers have a region that is "substantially free of agglomerated vacancy intrinsic point defects" as defined by this Court.

The first flaw that SUMCO identifies in Mule'Stagno's Second Declaration is the fact that Mule'Stagno has not identified a single test that meets the *Daubert* standard of reliability and that supports his conclusion that the accused wafers contain the claim limitation of an axially symmetric region. As SUMCO points out, MEMC has the burden of proving that SUMCO's wafers, which are formed from a different process than prior art wafers, are axially symmetric. Instead of proving axial symmetry, Mule'Stagno asks the Court to *assume* that the accused wafers are axially symmetric based solely

upon what he contends are similar "assumptions" made in prior art literature.[2] However, not only do these articles concern wafers formed by a different process, but Mule'Stagno's own subjective "summary" of the articles is not sufficient to meet the standard set forth in the Court's March 1, 2004 Order.

Similarly defective is Mule'Stagno's Sixth Declaration, in which he refers to two papers co-authored by Park and two SUMCO employees, Furuya and Harada. Although Mule'Stagno claims that these articles corroborate his view that all Czochralski wafers are axially symmetric, critically, his analysis fails to distinguish between silicon grown by prior art methods and silicon grown under the Park/Samsung method. Further, Mule'Stagno's summary of the articles is misleading. For example, while Mule'Stagno states that "[f]rom Figure 5, the authors identify an axially symmetric outer region of the silicon 20 mm wide," the term "axial symmetry" is, in fact, completely absent from the articles. As stated by the Ninth Circuit in *Domingo v. T.K.*, 289 F.3d 600 (9th Cir. 2002), "[n]othing in either *Daubert* or the Federal Rules of Evidence requires the district court to admit opinion evidence that is connected to existing data only

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[2] For example, Mule'Stagno asserts that Shimura's discussion of striations in wafers "demonstrates his appreciation and acceptance of the axial symmetry of Czochralski silicon." *See* Powers Decl. at Ex. 3. Mule'Stagno also asserts that Zimmerman's Figure 1 "reflects an understanding that one-half or even one-quarter of a wafer may be tested," and that in Voronkov's work "[i]mplied is the fact that these regions would have appeared the same regardless of the precise position of the longitudinal cut." *Id.*

by the *ipse dixit* of the expert." *Id.* at 607. As such, Mule'Stagno's bare assertion that axial symmetry is regularly "assumed" and does not need to be proven is insufficient to defeat SUMCO's Second Motion to Exclude Expert.

The second flaw that SUMCO identifies in Mule'Stagno's declarations is the fact that he has not provided objective verification that it is scientifically valid to prove axial symmetry by testing only a sliver of the accused wafer. This Court previously expressed concern regarding Mule'Stagno's opinion that "it is routine practice in the industry to test a single strip of silicon . . . to characterize the entire wafer." Mule'Stagno has done nothing to cure this deficiency other than to supplement his Expert Report with more conclusory opinions and diagrams.

Further, as SUMCO points out, although Mule'Stagno has supplemented his Expert Report with references to several secondary sources, he still has not achieved what the Court has asked him to do. For example, Mule'Stagno has not shown that the method upon which he primarily relies, Bulk Microdefect Density (BMD) testing, is generally accepted by or espoused by a recognized minority of scientists in his field as a reliable test to prove what Mule'Stagno is attempting to prove. In fact, although Mule'Stagno refers to articles by Obermeier, Lee, and Sasaki, his references are so vague that they provide no basis for the Court to conclude: (1) that the method used by the authors is practiced by a recognized minority of scientists in their field; or (2) that he has followed the same methodology in his own testing. In fact, SUMCO makes clear that Mule'Stagno has *not* followed

Obermeier's methodology. *See* Mot. at 9 (noting that Mule'Stagno used a different temperature for his first heat treatment than Obermeier, used a longer second heat cycle than Obermeier, and used a different etchant than Obermeier). Further, as SUMCO also points out, Mule'Stagno tested slivers of the accused wafers rather than the whole wafers that were tested by Obermeier, Lee and Sasaki, and provides no support or justification for this methodological difference. Additionally, Mule'Stagno's assertion that BMD testing is reliable is significantly undermined by the fact that he admits, in his Sixth Declaration, that the BMD testing he performed yielded inconsistent results when performed by different operators at different times. *See* Mathiowetz Decl. at Ex. 14 at p. 6.

Mule'Stagno's descriptions of the other tests he has performed are similarly defective. For example, to support his Light Point Defect (LPD) and Atomic Force Microscopy (AFM) testing, Mule'Stagno's Second Declaration cites one article by Fujise as evidence of objective verification, but does not offer any evidence that the Fujise article or method is generally accepted by or espoused by a recognized minority of scientists in the field. And again, even if the Court had a basis to conclude that the Fujise protocol is generally accepted, it appears that Mule'Stagno did not follow that protocol. *See* Mot. at 7, 18 (noting that Fujise and Mule'Stagno used different instruments to perform the test). In addition, although Mule'Stagno states that "AFM can distinguish between pits in the [wafer] surface caused by polishing from pits in the surface caused by an agglomerated defect," the Fujise article does not discuss measuring agglomerated COP defects at all, and therefore does not support this conclusion.

Similarly, in support of his Flow Pattern Defects (FPD) testing, Mule'Stagno's Second Declaration cites an article by Yamagishi and three other articles that have cited to Yamagishi, but does not offer any evidence that the Yamagishi article or method is generally accepted by or espoused by a recognized minority of scientists in the field as a recognized test for revealing and identifying agglomerated vacancy point defects in silicon materials within the detection limit required by the '302 Patent. Moreover, there does not appear to be any support in the Yamagishi article or the other sources for Mule'Stagno's conclusion that the flow pattern activity he identifies in the accused wafers is due to "contamination" or "damage" rather than the presence of agglomerated vacancy defects. Further, the Yamagishi article and the other sources do not provide objective support for Mule'Stagno's methodology of scanning only one quarter wafer for regions of agglomerated defects. Similarly, in his discussion of Copper Decoration testing, Mule'Stagno cites articles by Kulkarni and Yamauchi, but does not aver that the protocols in the Kulkarni and Yamauchi articles are generally accepted by or espoused by a recognized minorityw of scientists in the field for visually detecting the presence of agglomerated intrinsic point defects.

Additionally, the Court does not have sufficient evidence upon which it can conclude that Mule'Stagno's Oxygen Induced Stacking Fault (OISF) testing is scientifically reliable. Although Mule'Stagno's Second Declaration cites articles by Harada and Dornberger, Mule'Stagno does not appear to have followed the methodologies employed by either Harada or Dornberger. Instead, it appears that he has

mixed the two methods and has failed to provide any explanation as to why it was objectively valid to do so. Further, with respect to the Lifetime testing Mule'Stagno performed, Mule'Stagno's conclusory statements are so vague as to render the entire discussion of this methodology virtually meaningless. Indeed, in describing the relevancy of the test results, Mule'Stagno states only that "[t]he low oxygen levels contained in the accused wafers rendered these test result [*sic*] less meaningful. While they are consistent with the conclusions I reached in my report, I did not rely on the lifetime test results to support those conclusions." Powers Decl. at Ex. 3 at p. 7. Based on this ambiguous remark, the Court has no basis to determine whether Lifetime testing is scientifically valid. Indeed, Mule'Stagno's quick dismissal of Lifetime testing appears to lead credence to SUMCO's suggestion that Lifetime testing does *not* support Mule'Stagno's ultimate conclusion.

Quite tellingly, MEMC's Opposition brief fails to respond to the vast majority of defects SUMCO identifies in its Motion, discounting them as "insignificant" because SUMCO fails to "show how any of these differences would in any way change the outcome of any of Dr. Mule'Stagno's tests."[3] However,

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[3] MEMC also chooses to rehash arguments raised during claim construction and to debate, at length, whether SUMCO's definition of the term "axially symmetric" is proper. This argument is entirely irrelevant to the instant Motion, which focuses only on whether MEMC has sufficiently proven that Mule'Stagno's expert testimony is scientifically reliable and admissible under *Daubert*. Additionally, MEMC's attempt to rely on a previously undisclosed "expert," Dr. Werner Bergholz

as MEMC concedes, since MEMC is the proponent of the expert testimony, it is MEMC – and not SUMCO – who bears the burden of establishing the expert's admissibility. *Butler*, 984 F.Supp. at 1260. MEMC has utterly failed to meet this burden. Accordingly, the Court GRANTS SUMCO's Second Motion to Exclude Expert.

## CONCLUSION

IT IS HEREBY ORDERED THAT Defendants' Motion to Exclude the Expert Report and Testimony of Plaintiff's Proposed Expert Luciano Mule'stagno [Docket No. 502] is GRANTED.

IT IS SO ORDERED.

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("Bergholz"), is improper. Bergholz's declaration does not constitute the type of "objective source, such as a learned treatise, the policy statement of a professional association, a published article in a reputable scientific journal or the like" which this Court's Order required, and his testimony does not cite to any objective authoritative source of the type required by the Order. In addition, Bergholz does not describe any personal knowledge about the accused products or patent claim limitations, or explain why his experience with prior art silicon wafers applies to wafers produced by the Park/Samsung method. Further, it appears that Bergholz did not review or confirm the validity of Mule'Stagno's testing procedures of the accused wafers, or the resulting data, or the quality or accuracy of the conclusions reached by Mule'Stagno. Accordingly, Bergholz's testimony has been disregarded by the Court.

Dated: 2/24/06

SAUNDRA BROWN ARMSTRONG
United States District Judge

## APPENDIX D

**UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

**Nos. 2006-1305, 2006-1326**

**[Filed October 17, 2007]**

MEMC ELECTRONIC MATERIALS, INC., Plaintiff-Appellant,

v.

MITSUBISHI MATERIALS SILICON CORPORATION, MITSUBISHI SILICON AMERICA CORPORATION, SUMITOMO MITSUBISHI SILICON CORPORATION (also known as Sumco), SUMCO USA CORPORATION (also known as Sumco USA), and SUMCO USA SALES CORPORATION (also known as Sumco USA Sales), Defendants-Cross Appellants.

NOTE: This order is nonprecedential

**ORDER**

Before Schall, Circuit Judge, Plager, Senior Circuit Judge, and Dyk, Circuit Judge.

A petition for rehearing having been filed by the Appellant,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petition for rehearing be, and the same hereby is, DENIED.

The mandate of the court will issue in due course.

FOR THE COURT
/s//JB
Jan Horbaly
Clerk

Dated: 10/17/2007

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## APPENDIX E

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## PART II. PATENTABILITY OF INVENTIONS AND GRANT OF PATENTS
## CHAPTER 11. APPLICATION FOR PATENT

### 35 U.S.C. § 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by

reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

## Federal Rule of Civil Procedure 56

### Rule 56. Summary Judgment

(a) FOR CLAIMANT. A party seeking to recover upon a claim, counterclaim, or cross-claim or to obtain a declaratory judgment may, at any time after the expiration of 20 days from the commencement of the action or after service of a motion for summary judgment by the adverse party, move with or without supporting affidavits for a summary judgment in the party's favor upon all or any part thereof.

(b) FOR DEFENDING PARTY. A party against whom a claim, counterclaim, or cross-claim is asserted or a declaratory judgment is sought may, at any time, move with or without supporting affidavits for a summary judgment in the party's favor as to all or any part thereof.

(c) MOTION AND PROCEEDINGS THEREON. The motion shall be served at least 10 days before the time fixed for the hearing. The adverse party prior to the day of hearing may serve opposing affidavits. The judgment sought shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law. A summary judgment, interlocutory in character, may be rendered on the issue of liability alone although there is a genuine issue as to the amount of damages.

(d) CASE NOT FULLY ADJUDICATED ON MOTION. If on motion under this rule judgment is not rendered upon the whole case or for all the relief asked and a trial is necessary, the court at the hearing of the motion, by examining the pleadings and the evidence before it and by interrogating counsel, shall if practicable ascertain what material facts exist without substantial controversy and what material facts are actually and in good faith controverted. It shall thereupon make an order specifying the facts that appear without substantial controversy, including the extent to which the amount of damages or other relief is not in controversy, and directing such further proceedings in the action as are just. Upon the trial of the action the facts so specified shall be deemed established, and the trial shall be conducted accordingly.

(e) FORM OF AFFIDAVITS; FURTHER TESTIMONY; DEFENSE REQUIRED. Supporting and opposing affidavits shall be made on personal knowledge, shall set forth such facts as would be admissible in evidence, and shall show affirmatively that the affiant is competent to testify to the matters stated therein. Sworn or certified copies of all papers or parts thereof referred to in an affidavit shall be attached thereto or served therewith. The court may permit affidavits to be supplemented or opposed by depositions, answers to interrogatories, or further affidavits. When a motion for summary judgment is made and supported as provided in this rule, an adverse party may not rest upon the mere allegations or denials of the adverse party's pleading, but the adverse party's response, by affidavits or as otherwise provided in this rule, must set forth specific facts showing that there is a genuine issue for trial. If the adverse party does not so respond,

summary judgment, if appropriate, shall be entered against the adverse party.

(f) WHEN AFFIDAVITS ARE UNAVAILABLE. Should it appear from the affidavits of a party opposing the motion that the party cannot for reasons stated present by affidavit facts essential to justify the party's opposition, the court may refuse the application for judgment or may order a continuance to permit affidavits to be obtained or depositions to be taken or discovery to be had or may make such other order as is just.

(g) AFFIDAVITS MADE IN BAD FAITH. Should it appear to the satisfaction of the court at any time that any of the affidavits presented pursuant to this rule are presented in bad faith or solely for the purpose of delay, the court shall forthwith order the party employing them to pay to the other party the amount of the reasonable expenses which the filing of the affidavits caused the other party to incur, including reasonable attorney's fees, and any offending party or attorney may be adjudged guilty of contempt.